NATIONAL CAR BUILDER

VOLUME XII. NUMBER 9.

DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

$1.00 PER ANNUM. SINGLE NUMBERS, TEN CENTS.

NEW YORK: Published at 5 and 7 Dey St.

SEPTEMBER, 1881.

Entered at the Post Office at New York, N. Y., as Mail Matter of the Second Class.

CHICAGO: 144 N. Clark Street.

NATIONAL CAR-BUILDER DIRECTORY.

IRON CLAD PAINT.

Trade-Mark Patented.

This Paint is used by nearly all the Railroads in the Country.

Used by L. S. & M. S., Wabash R'y, C., C., C. & I. R'y, C. & P. R'y, C. H. & D. R. R., Cincinnati Southern R'y, N. Y., L. E. & W. R'y (Erie), Southern Central R. R., Canada Southern, Mobile & Ohio, N. O. & Mobile, Macon & Brunswick, Penn. R. R., C., M. & St. P. R'y, A. & N. R'y, R. & D. R'y, Carolina Central, P., C. & St. L. R'y, P. & E. R. R., M., L. S. & W. R'y, K. & D. M. R'y, W. C. & A. R. R., M., I. & N. R'y, N. C. & St. L., N. I. & E. R. R., I. & G. N. R. R., etc., etc.

IRON CLAD PAINT CO., Cleveland, Ohio.

Established 1858.

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COMPANY,

SOLE MANUFACTURERS OF

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The best Paint in the World for Iron, Tin and Wood.

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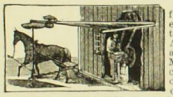

The best **Horse Power** for pumping and for running elevators. Respectfully refer to Mr. Oran Ott, Gen. P. Agent Ill. Central R. R. Co., and Mr. W. R. Woodard, Master Carpenter of that company, as to the merits of the powers. Send for circulars and prices.

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NEW PATTERN CAR BOX JACK.

WITH PERFECT

Seamless Screw

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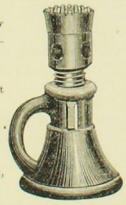

Screw, 2¼×7 in. below head.

Will lift twice the weight required.

Liberal Discounts to Railroads.

Also, ordinary **Bell Jacks.**

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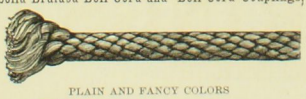
38 Hanover St., SPRINGFIELD, Mass.

Solid Braided Bell Cord and Bell-Cord Couplings,



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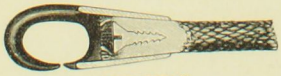

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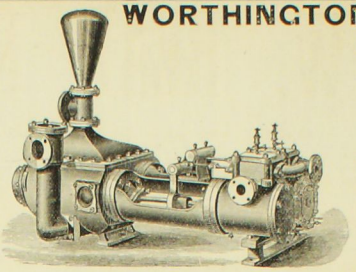

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Prices below those of any other Steam Pump in the Market.

SEND FOR CIRCULAR.

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DIRECT IMPORTERS OF

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WHICH WE MANUFACTURE

TO SIZES ESPECIALLY ADAPTED FOR CAR-BUILDERS.

Manufacturers of VENEERS from FRENCH WALNUT and all DOMESTIC WOODS. Importers of CABINET WOODS.

ESTIMATES FURNISHED.

Mills and Warehouse: 685 to 707 West Sixth Street, Cincinnati.

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FOUR AWARDS!!!

ALL OF THEM THE HIGHEST GIVEN,

AT

AUSTRALIAN WORLD'S FAIR.

MELBOURNE, 1880-81.

FOR CARTER'S WRITING FLUIDS, INKS AND MUCILAGE.

Manufactured by CARTER, DINSMORE & CO., Boston and New York.

CLARE FIBRE COMPANY,

Manufacturers and Patentees of

"CLARE FIBRE," a stuffing material made from the leaves of the Southern Pine. These goods are remarkably tough and durable. They are manufactured with a short, crisp curl, giving them great strength and elasticity. They are absolutely free from waste and never break or dust down like moss and Excelsior; also,

"JAPANESE HAIR," a substitute for Curled Hair. These goods are the lightest, toughest article in the market, and are warranted to do 75 per cent. more work than the same weight of moss or hair. They are glossy black color, hardly to be distinguished from curled hair, and are absolutely without waste.

Both these articles have had large success with the Bedding and Upholstery Trades, and are offered to the American Car-Builders with the greatest confidence. Write for samples and particulars to

Patented April 20 and December 7, 1880.

Patented Jan. 1, 1867; May 5, 1874; April 20, 1880 Dec. 7, 1880.

CLARE FIBRE CO.,

Cor. Green and Bay Streets, Jersey City, N. J.

AMERICAN BARB FENCE WIRE.

PAINTED, JAPANNED OR GALVANIZED.

This Wire contains six times as many Barbs per foot as any other, and is the only Fence that is as efficient against small as against large animals. It will not slip through the Staple, and is the only Barb Wire that is **Galvanized after it is Finished,** which adds greatly to its strength and durability. This Wire is made on an entirely different principle from any other, amply secured by Letters Patent and no infringement upon any other Patent Right.

AMERICAN FENCING CO.,

Works: { Nos. 232, 234, 236, 238 West 29th Street. Nos. 229, 231, 233, 235, 237, 239 West 28th Street

Office: 234 West 29th Street, New York

LOWE'S METALLIC PAINT COMPANY,

CHATTANOOGA, TENNESSEE,

MANUFACTURERS OF

LOWE'S METALLIC PAINT!

This Paint has now been before the public sufficiently long to establish its qualities as first-class Metallic Paint in every respect.
It has covering properties superior to any other Metallic Paint made.

It takes about 18 per cent. less Oil than any other Metallic Paint.

It is absolutely free from Sulphates of every kind and description, which in many other Metallic Paints prove so injurious to Iron and Tin Roofs.
It is manufactured in a very superior manner by being re-ground and carefully prepared, and is entirely available for inside finish when dark colors are desired.
Its natural color is a Uniform Dark Blood Red. It is

Warranted not less than 55 per cent. Metallic Iron,

thus giving it a body excelled by no other Paint made.
Its Fire Proof properties are excellent, and houses constructed of wood, and especially shingle roofs, are very materially protected by application of this Paint.
It is not calcined nor burnt, consequently its color is unchangeable.
We have Freight arrangements to nearly every city in the United States and Canada, and would name Prices delivered.
Please read the Certificates hereto attached.

East Tennessee, Virginia & Georgia Railroad—Main Stem, Office of General Superintendent, Knoxville, Tenn., April 18, 1881.

S. B. Lowe, Chattanooga, Tenn.:
Dear Sir: * * * I will say that this company is using it both upon its Main Stem and Selma Division, and has found it perfectly satisfactory, and equal to any Lehigh Brown that we have used. It mixes well and spreads smoothly, and I find it much the cheapest paint that I can use for freight cars and such purposes. Very truly yours,
JNO. F. O'BRIEN, Gen'l Supt.

Wilkins, Post & Co., Engineers and Bridge Builders, Atlanta, Ga., and 102 Broadway, N. Y., Atlanta, May 16, 1881.

S. B. Lowe, Chattanooga:
Dear Sir: We have been using your paint on all the iron bridges that we are constructing on the M. & C., Georgia Western, and other railroads through the South, and find it of very superior quality *requiring less oil* and working with ease, and having excellent covering properties.
Respectfully, WILKINS, POST & CO.

Office of Peaslee, Gaulbert & Co., Manufacturers of White Lead, Colors, Ready Mixed Paints, etc., Louisville, Ky., April 15, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:
Dear Sirs: * * * Your Metallic Paint has given perfect satisfaction wherever we have placed it. In grinding we find it takes from ten to twenty-five per cent. less oil than various other brands of oxide of iron we have heretofore handled.
Very truly yours, PEASLEY, GAULBERT & CO.

King's Iron Bridge & Manufacturing Co., Cleveland, O., May 23, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:
Gentlemen: We find your paint of first-rate quality for our use, and very economical. Yours truly,
KING BRIDGE CO.

Office of Scott & Co., Manufacturers of Scott's Sheet Iron Roofing, Cincinnati, May 4, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:
Gentlemen: We consider it as good as any that we have used during our experience of over nine years, and shall use it largely. Yours, etc.,
SCOTT & CO.

W. G. Hyndman & Co., Manufacturers of Patent Sheet Iron Roofing, Cincinnati, May 3, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:
Gentlemen: The paint which we received from you last month has given us perfect satisfaction. We regard it as the best iron ore paint that we have ever used.
Respectfully yours, W. G. HYNDMAN & CO.

P. S.—Please forward us immediately two (2) tons more on our order.
Wason Car and Foundry Co., Chattanooga, Tenn., May 3, 1881.

S. B. Lowe, City:
Dear Sir: For some time past we have been using the Lowe Metallic Paint upon all the cars built at our shops, and, as it gives entire satisfaction to our customers, it is our purpose to continue the use of it.
F. F. MORRILL, Sec'y.

Cincinnati, Hamilton & Dayton R. R. Co., Operating the Dayton & Michigan, Cin'ti, Richmond & Chicago, and C. H. & I. R. Rs.
W. H. H. Allison, Master Car-Builder.
Cincinnati, June 14, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:
Gentlemen: We have been using your Metallic Paint on freight cars, at our shops, for the last four months, and find it a better paint than we ever used for that purpose.
Yours respectfully, W. H. H. ALLISON.

Laboratory of Fred P. Dewey, Chemist to Roane Iron Co., Chattanooga, Tenn., April 6, 1881.

S. B. Lowe, Esq.:
Dear Sir: I have given samples of your paint ore a careful analysis with a special view of ascertaining if there is any substance in it calculated to prove injurious to tin or iron roofs, and am free to say that I find it remarkably free from sulphides of every kind, or anything else that could prove injurious to either tin or iron roofs. Yours respectfully,
FRED P. DEWEY, Ph. B., Analytical Chemist

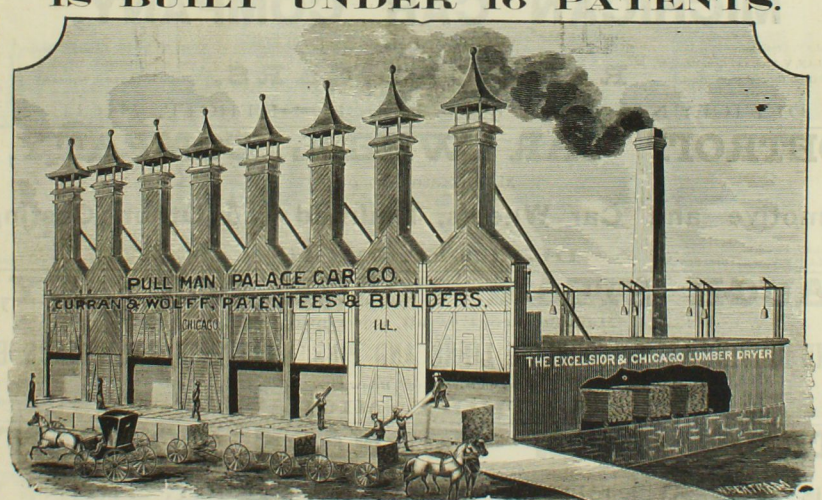
Office of Norton & Wieder, Paints, Oils, Varnishes, Glass, Sash, Doors and Blinds, St. Louis, May 30, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:
Gentlemen: We have used and sold—in the course of the past year—enormous quantities of your Metallic Paint, and we find that less oil is required for yours than for other Metallic Paints. Yours truly,
NORTON & WIEDER.

THE EXCELSIOR AND CHICAGO LUMBER DRYER

IS BUILT UNDER 16 PATENTS.

PAYS FOR ITSELF EVERY YEAR. Storing Capacity, 40,000 feet Inch Lumber.



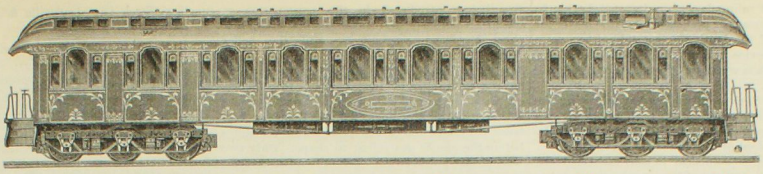
DRYING 8,000 FEET PINE LUMBER EVERY 24 HOURS.

RAILROAD COMPANIES AND CAR-BUILDERS WHO ARE USING THE EXCELSIOR AND CHICAGO LUMBER DRYER.

	No. of Dryers.
Pullman Palace Car Company, Chicago	8
Wells & French Co., Chicago	3
C. & N. W. Railroad, Chicago	3
Flint & Pere Marquette R. R., Saginaw	1
Peninsular Car Works, Detroit	1
Michigan Car Company, Detroit	2
Memphis & Charleston Railroad, Memphis	1
Ohio Falls Car Company, Jeffersonville, Ind	2
Indiana Car Company, Cambridge City, Ind	1
Haskell & Barker Company, Michigan City, Ind	1
Denver & Rio Grande Railway, Denver, Col	2
Atchison, T. & S. Fe Railway, Topeka, Kan	4
Barney & Smith Company, Dayton, O	4
Missouri Car & Foundry Co., St. Louis	1
Blain Bros., Huntingdon, Pa	1
U. S. Rolling Stock Co., Chicago	2

CURRAN & WOLFF, Proprietors and Builders, 39 and 41 FRANKLIN STREET, CHICAGO, Ill.

THE NATIONAL CAR-BUILDER.



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VOLUME XII. NUMBER 9 — SEPTEMBER, 1881. — SINGLE NUMBERS, TEN CENTS, $1.00 PER ANNUM.

Miscellaneous Items.

THE Allen Paper Car Wheel Co. are more behind in the filling of orders than before starting the new works at Pullman, and arrangements are in progress for duplicating the machinery in these works at once.

THE Gilbert Car Works in Buffalo, N. Y., have taken a contract to build 500 freight cars for the Buffalo, Pittsburg & Western, and the Buffalo, New York & Philadelphia roads. The cars are to carry 20 tons each.

ANOTHER plan is reported for improving the ventilation of passenger cars. It is similar to the method employed in many of our large city restaurants, and consists of wings like propeller-blades, which are revolved by being connected with a line of shafting. There may be something in this, but we do not think it is altogether practicable for cars, especially sleepers, for two principal reasons—the want of sufficient room for the shafting and wings to work in, and the power to keep them in motion.

THE Inter-State Industrial Exposition at Chicago will open September 7 and close October 22. There will be an improvement in all departments over any previous year. The machinery department will occupy a space of 240 by 600 feet, all of which will be filled without accommodating all the applicants, and constituting the largest exhibition of machinery ever made in this country except at the Philadelphia Centennial. The display will consist of all kinds, both light and heavy, including a large variety adapted to railroad uses in machine and car shops, and will be driven by 1,200 feet of shafting. The exhibitors are from all parts of the country, the Eastern cities being well represented.

SINCE the introduction of steel rails and steel-tired driving-wheels there has been a considerable loss of adhesion in locomotives. This, of course, makes trouble in starting and in going up grades. To load the drivers with a continuous weight sufficient to produce the adhesion required would be hard on the track. To meet the difficulty, some one has invented a "contrivance" by which a part of the weight on the tender can be transferred at will to the driving-wheels in exact proportion to the work the engine is doing. This contrivance, of the details of which we are not advised, is said to have been successfully applied to one engine of the Boston & Albany road which was short of adhesion, and which generally used a box of sand in making a trip.

THE Rhode Island Locomotive Works have delivered to the Atlantic & Pacific Railway Co. 10 locomotives, weighing 60 tons each, in running order; length over all 60 feet; cylinders, 20 × 26; capacity of tenders, 3,500 gallons; weight of each, 35 tons. There are 4 pairs of coupled drivers, 50 inches in diameter, and one four-wheel truck. The fire-box is 10 feet long and 43⅛ inches wide. The boiler is 58 inches in diameter, wagon top, and contains 200 2¼-inch tubes. There are a set of steam-gauge cocks for the fireman located at the back head of the boiler, and another set for the engineer, inside the cab. The tops of the cabs are higher than the smoke-stacks of the engines used on the Eastern railroads. The height of the smoke-stacks from the top railing is 16 feet 6 inches. Either hard or soft coal can be burned. The great size and weight of the engines are made necessary by the heavy grades they will have to overcome.

THE Chicago, Milwaukee & St. Paul road is receiving from the Rhode Island Locomotive Works, four a week of a lot of 30 10-wheel locomotives, with cylinders 19 × 24, drivers 4 ft. 6 in., boilers 54 in., fire-boxes 78 × 34⅛ × 70 in., 171 2¼ in. tubes 14 ft. long, and weighing 50 tons. Tank capacity 3,250 gallons. These are to be followed from the same builders by 10 8-wheel engines with 17 × 24 cylinders, 5 ft. drivers, 50-in. boilers, fire-boxes 72 × 34½ × 66 in., 177 2-in. tubes 12 ft. long, and weighing 40 tons. Tank capacity 2,750 gallons. The road bought last year over 7,000 new freight cars, and is still getting more. Of these the Wells & French Co. are building 300 flat, and the Michigan Car Co. 250 box cars, all of 20-tons capacity, and having M. C. B. axles and journal boxes. The stock cars are 33 ft. long inside. Eight new coaches have just been received from the Harlan & Hollingsworth Co. They have 4-wheel trucks with 8 feet wheel base.

THERE never has been such a busy time at the Union Pacific shops at Omaha as there is at the present season. The numerous extensions of the line, the acquisition of new roads, and the large amount of repairing required on the main line have combined to make an unprecedented rush of work, requiring an increased force of men as well as the running of the shops until 11 o'clock at night. The prospects now are that an all-night force will soon be put on. In the car department there are over 600 men employed, and in the locomotive department 1,100. The new car-work includes 20 cars for the Nevada Central, 12 way cars for the main line, a large number of stock and box cars for the Colorado Central (narrow gauge), and 150 coal houses for the various stations; also 3 baggage cars for the Julesburg extension, and 6 for the main line. Besides, numerous coaches are being rebuilt and repaired. Mr. Stevens, the general superintendent of the car department, is putting up an additional shop 180 × 300 ft.

THE plan of paying premiums for the saving of coal by firemen and engineers on the Pennsylvania Railroad works well. A certain amount of coal is allowed per car per train mile, and whatever the men save of this allowance is paid to them at the rate of 13 cents per 100 pounds, which is a trifle less than the coal costs the company. The list for June shows payments ranging from 83 cents to $20. The cost per train mile varies with the kind of service, and the weather also affects the consumption of fuel, so that a man sometimes makes a premium one month and exceeds his allowance next month with the same mileage. One man made $15.12 in June and only $6.25 in July, and one engine saved $40 in three months. Every engine has an account with the coal yard, and every crew a separate account with the engine, so that half a dozen men may have a fuel account with a single engine at the end of the month. The men who handle fuel on this road have in this way learned to practice economy in its use to the mutual advantage of the company and themselves.

THE forthcoming report of the Ohio Railroad Commissioner states that the whole number of persons killed and injured on the railroads of that State during the last 13 years is 6,470. It is also estimated that, including employés, passengers and others, some one is either killed or injured on these roads every 17 hours and 36 minutes, on an average; and with respect to employés alone, one in every 31½ hours. The average number of persons employed each year during this period is 15,034. These figures are no doubt approximately correct. At all events, they are not likely to be very greatly exaggerated, nor is it reasonable to suppose that railroad casualties, in proportion to mileage and traffic, are more numerous in Ohio than elsewhere. In a large number of cases these accidents are the result of individual carelessness or neglect, but it is gratifying to know that railway managers are doing more and more every year for the protection of this class of people. The sums paid by the companies every year as compensation for injuries to employés and others, are enormous, and as a mere matter of economy in the saving of money, to say nothing of individual suffering and loss, every means should be adopted for the better protection of life and limb.

MR. CHARLES LATIMER, Chief Engineer of the New York, Pennsylvania & Ohio road, has placed on the frogs and guard rails in the Cleveland yard a new invention, called a "foot-guard," and which is designed to prevent people from being caught in these traps and held fast to be either killed or injured by switching or other engines. Hundreds of persons are caught in this manner every year, and there is an urgent demand for some effective means for its prevention. Mr. Latimer first tried a dozen of these appliances in the yard, and has since ordered ten dozen more to be distributed on the line. The invention consists of a flat steel spring placed in the opening, or "boot-jack" ends, of frogs and guard rails, or in any place where one's foot would be likely to be caught. This spring fills the place sufficiently to keep the foot out of it, while it will yield at the same time to the pressure of the wheel flanges, and thus avoid any risk of running the wheels off the track, which would not be the case if a rigid substance instead of a spring were used. Casualties of this kind have become so frequent in Michigan that the legislature of that State at its last session, and just before its close, passed a bil

requiring all railroads within its jurisdiction to adopt some means of prevention, but the Governor having failed to sign it the act did not become a law. The device referred to is both simple and effective, and is worthy of the attention of all railway officers.

THE *Ohio State Journal* has the following description of a new private car built at the Altoona shops of the Pennsylvania R. R., for W. R. McKeen, President of the Vandalia Division:

"The interior is finished in ash, varnished and rubbed down until the glitter of the varnish is lost in the plain color of the hard wood. This finish gives the walls and roof and furniture—everything is ash—a very tidy appearance; nothing could look cleaner. The parlor, in the rear end, contains six arm chairs, a secretary and extension table. The next room, a sleeping and dining room, contains eight berths. The lower seats run lengthwise, making sitting accommodations for each side of the table. Going forward, next in order, and very conveniently bunched, are the heater, a closet, washstand and linen closet. Over these, supported by the various partitions round and about them, is a sixty-gallon roof tank for water. The tank is out of sight; its existence would not be surmised, except by inquiry as to where the water came from. Next, on the right, is a private bed-room, with washstand and closet, and bed across the car. From the bed and from the parlor, by means of a cord, the occupant of the car may put on air brakes and stop the train. From two places in this room, and from eight other places in the car, electric signals communicate with the kitchen in front. The kitchen is supplied with a ship stove and sheet-iron compartment up the pipe for keeping food warm, with a coal box, sink, drawers, cupboard, ice chest and upper berth for a porter. An extra mattress, to be laid on the ice chest, makes sleeping room for an extra porter. The lamps and heater are the same that are found in Pullman cars. Mr. Levi Geesey, the foreman of the passenger car shops at Altoona, delivered the car in Columbus."

The Aurora, Ill., Shops of the Chicago, Burlington & Quincy R. R.

Although many roads have finer shop buildings, the mechanical department of this road may be taken as a model for completeness of organization, systematic methods, and thoroughness of workmanship. As an evidence of this, the road has just furnished another road that wished to adopt its designs of rolling stock, 500 blue prints of car work from drawings in hand. The superintendent of the locomotive and car departments, Mr. H. B. Stone, has his office here, and one-third of the wages on his pay rolls is paid to the 1,300 men employed in these shops, and who are under the direct charge of Mr. W. D. Rowley, the master mechanic. In the locomotive shops, besides the running repairs and rebuilding incident to the care of 105 engines on the Chicago division, a large amount of rebuilding and other work is done for the other division shops of the road, such as turning wheels, forging frames, axles and crank pins, casting and fitting cylinders and saddles, all the brass work, amounting to some 60,000 lbs. per month, etc. The shops are now engaged on a new 70-foot turn-table for the new Chicago round-house, and in adding the Westinghouse automatic brake attachments to all the passenger cars and engines. During the present season they have built two 8-wheel locomotives, class A, with cylinders 17×24 and 5-foot drivers; and 4 switching engines, class E, with 16×22 cylinders, four 4-foot drivers and no trucks. Four more of the former and five of the latter class will be built as fast as the running repairs will permit. All new engines have two injectors and no pumps. Changes are also being introduced in the construction of springs, equalizers and boilers. Switching engines have no wagon-tops, and the boiler course over the fire-box is in one sheet 54×168 inches. In the 8-wheel engines, which have wagon-tops 13 inches high, this boiler-course is in two pieces, with the seam on the side above the water-line. All the holes for stay-bolts, studs and braces, are punched to templates before the sheets are rolled to shape. Only two washers are put between each crown-bar and the crown-sheet. The first bar has its washers on the second bolts from the ends, the next one on the third, and so on, the washers being placed only on every other second and third bolt. These washers are tapered to cover as little space as possible on the crown-sheet. All the longitudinal seams are above the water-line and double riveted, zig-zag. The stay-bolts in the third, fourth and fifth rows from the bottom around the fire-box, are perforated to admit air to the fire. The passenger locomotives only have fire brick in the fire-boxes. They are straight bricks, laid upon three flues running from the flue-sheet below the flues up over the door opening. Upon each side of the head-lights is a glass window painted black, excepting the large block figures of the number of the engine, which are thus made luminous, and show distinctly in the night.

An attachment is used to the Sellers wheel-lathe, which hoists in the wheels by steam power. There is also a little portable steam engine on three wheels, the main pair 10 in. and the leading one 6 in. in diameter. It has three cylinders about 2½×4 in., placed equi-distant around a universal crank, to which the piston of each cylinder is attached. It is supplied with steam from the heating pipes, and its power used through a flexible shaft in the place of man power for boring out cylinders, planing valve-seats, drilling holes, turning in stay-bolts, and the like. It was built by John Hewitt, Superintendent of motive power of the Missouri Pacific road, at St. Louis, and is a very convenient labor-saving appliance. The men working inside of boilers and fire-boxes avoid the smoke of lamps by using gas light, a rubber tube connecting the burners with the gas pipes around the shop. The tool room is very complete, and besides tools, includes gauges and templates for nearly every part of the engine, so that all pieces of each class of engines are interchangeable.

In the passenger car shops for general repairs are 10 passenger, 3 baggage and 3 way cars. The new work is 1 mail car, 55 ft. 6 in. long over sills, and 9 ft. 8 in. wide; 2 baggage and mail cars, with bodies 45 ft. long, 9 ft. 8 in. wide; and 10 way cars of a lot of 40 to be built. They are 28 ft. long over sills, and 9 ft. 1½ in. wide. The outside painting is—bodies, orange; clear story, English vermilion; ladders and door-steps, Tuscan red, and the hand-railings and other iron-work, gloss black; inside, the ceiling is pea-green and the sides straw-color. In the year 1880, 68 passenger, 27 baggage, 5 dining and 14 sleeping cars were rebuilt, and 4 baggage and 6 passenger cars built anew. This season a state-room car and 9 coaches have been built, and 4 more will soon be commenced. The inside finish will be butternut panels and black walnut moldings. In the freight shop about 100 cars are built every month. Stock and box cars are built according to the new designs, with improved trucks and capacity of 20 tons. The road has now a total of 16,499 freight cars, which is an increase of 2,653 since last year. About 20,000 pairs of wheels a year are turned and pressed on. All brasses for cars and engines are trued up and made to fit the journal by swedging them upon a standard steel journal with two or three blows of a steam hammer, after which they are lead-lined about ⅛ in. thick by the Hopkins process.

Standard Stock Car—Louisville & Nashville Railroad.

DIMENSIONS OF CAR BODY.

Length of body over end sills	29 ft. 10½ in.
Length inside of end siding	29 " 3½ "
Width of body outside of posts	9 " 2 "
Width of door-opening in the clear	5 " 7¼ "
From top of sill to under side of plate	6 " 9 "
Center of bolster to outside of end sill	4 " 5¼ "
Bottom of sill to top of plate	7 " 11½ "
Between center sills	10 "
Between side and intermediate sills	1 " 11½ "
Between center and intermediate sills	12 "
Between centers of bolsters	21 " 0 "
Between centers of center-ties	6 " 3 "

TIMBER FOR CAR BODY—FINISHED SIZE.

2	Outside sills	yel. pine	4½ x 9	in.
2	Intermediate sills	"	4 x 9	"
2	Center sills	wh. oak	4 x 9	"
2	End sills	"	5 x 9	"
2	Bolsters	"	4 x 12	"
2	Center-ties	"	4 x 8	"
4	Draft-timbers	"	4 x 8	"
2	Deadwoods	"	4 x 9	"
2	Side-plates	"	2¾ x 5½	"
2	End-plates	"	2½ x 12¾	"
4	Corner-posts	"	5 x 5	"
4	Door-posts	"	3¾ x 3½	"
8	Intermediate-posts	"	3¾ x 3½	"
4	End-posts	"	2½ x 4¾	"
12	Side-braces	"	2 x 3½	"
4	End-braces	"	2½ x 3½	"
6	Carlins	"	1¾ x 9½	"
1	Ridge-pole (at center)	"	2¾ x 5	"
2	Purlins	"	1¾ x 3	"
1	Running board	yel. pop. or wh. pine	12 x 2¼	"
4	Door-pieces	wh. oak	1¼ x 7	"
2	" "	"	1¼ x 9	"
4	" "	"	1¼ x 8	"
4	Blocks for truss-rods	"	4 x 4	"
14	Door-slats	"	5 x 1	"
32	Side-slats	"	5¼ x 1	"
2	Facial-boards	pine or pop.	5¼ x 1	"
4	End-facials	" "	5¼ x 1	"
1	Top slide for end door	wh. oak	2 x 1¾	"
1	Stop for end door	"	2 x 1½	"
4	Side base-boards	"	10 x 1¾	"
2	End " "	"	10 x 1¾	"
1	Sill for end doors	"	2½ x 3	"
1	Top-batten for end door	pine or pop.	1 x 3	"
1	Bottom-batten for end door	" "	1 x 4½	"
2	Molding under roof	" "	0⅝ x 1¾	"
4	Molding under roof on ends	" "	0⅝ x 1¾	"
100	Sup. feet end siding	" "	1	.....
294	Sup. feet roofing	" "	1¾	.....
275	" " flooring	pine or wh. oak	1⅜ / 1¾	.....

The ends of car to be boarded up with 1 in. yellow pine or yellow poplar flooring, dressed and matched, and no piece wider than 6 in. The flooring to be of oak, 1¾ in., or yellow pine not less than 2 in. thick, dressed on top and matched, no piece to be over 9 in. wide. Roofing to be of Wand's patent, clear poplar or white pine 1¾ in. thick, to be boiled in a mixture of equal parts of "4-ace" paint and coal-tar spirits. Draw-bars 31⅛ in. long and center 33 in. above rail. The trucks are the road's standard pattern as shown and described in MAY CAR-BUILDER.

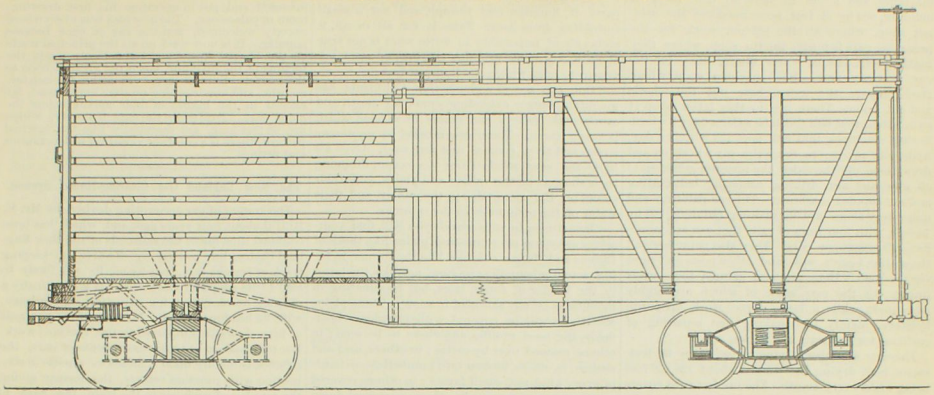
Total weight of castings for car body		1,044 lbs.
" "	wrought iron for car body	989 "
" "	bolts, nuts, rods and washers, for car body	649 "

The Pennsylvania Railroad Shops at Altoona.

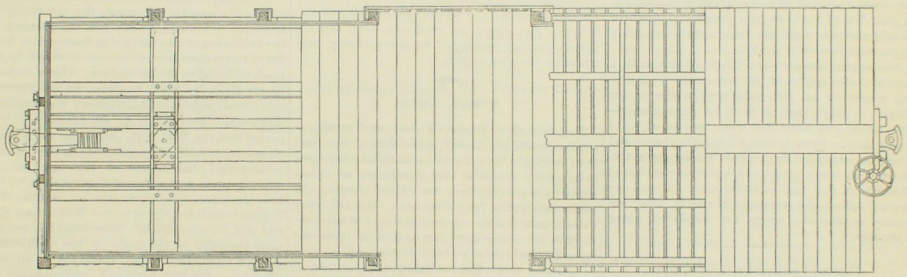
A recent number of the *Iron Age* contains an elaborate account of the railway shops at this place. The locomotive department comprises a number of extensive buildings, equipped with the most approved appliances of every description, in which the building and repairing are done, and also a large amount of general iron work necessary for a first-class railway, except the rolling of plates, rails and bars. All the switchings, crossings and signals are made here, car wheels are cast, castings are made for the cars, bridges and buildings; tools are made and repaired, machinery constructed, oils mixed and prepared, and telegraph instruments and appurtenances manufactured.

The wheel foundry is full of hydraulic cranes, each swinging around a circle about 13 feet in di-

STANDARD STOCK CAR—LOUISVILLE & NASHVILLE RAILROAD.



Section and Side Elevation.

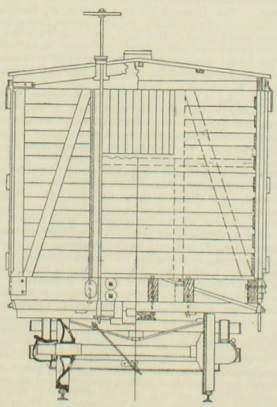


Frame. Floor. Roof.

ameter, around which is placed a dozen molding flasks. A big ladle, holding 10 tons of molten iron, supplies small ladles, which travel all around this foundry and fill the molding flasks, while two cupolas melt the iron. Adjoining is the annealing room, containing 45 pits arranged in two circles, one within the other, where the wheels are annealed, each pit holding about 20 wheels. The wheel foundry, employing over 100 men, who cast about 200 wheels a day, uses up in the operation about 25 tons of iron. A peculiarity of this work is the fact that, although the molds are all made alike, yet the wheels vary in size, sometimes a half-inch in circumference, due to the variation in hardness of the iron. Pairing them by measure with a brass tape is therefore necessary, the diameter being stenciled upon them.

The locomotive shops employ about 2,300 men, and can turn out 100 locomotives a year, besides repairing as many more. They built 85 new locomotives last year. The chemical and physical laboratories are well appointed and under excellent management.

The car shops cover over 76 acres, with the adjacent shops for the department of maintenance of way. The great round house, which is a 40-sided polygon, is the place where freight cars are built and repaired. It is 430 feet in diameter, and



End Elevation and Section.

has 40 radiating tracks converging to a central turntable, 65 feet in diameter. This turntable is not roofed over, but the round house has an inner wall, so that it represents a huge ring, with outer and inner walls about 100 feet apart. There can be 114 freight cars building in this shop at one time, and 500 new cars can be turned out in a month, all the materials completed elsewhere being brought here and put together. If there is no new building going on there can be 2,000 cars repaired in a month.

The passenger-car erecting shop covers 210 by 133 feet, and has five lines of rails, while 20 cars can be building in it at one time, and, on an average, one new passenger car can be turned out for every day in the year. The planing mill is 222 by 73 feet, and contains nearly all the wood-working machines, the rough timber being here made up into the parts required for cars. These machines cut up 2,000,000 feet of lumber in a month. The sawdust and shavings are conducted by air draft to two capacious towers near the boiler house, where they are used for fuel.

The blacksmith shop is 358 by 73 feet, and contains 34 double forges, besides other furnaces for heating bolts and springs. The forges are arranged on the long sides of the building, while in the central space are steam hammers, punching and bolt-making machines, drilling and shearing

machines, and a fan to blow all the fires. A building, 302 by 73 feet, accommodates the cabinet shop, where all the cabinet work for the passenger cars is made; the tin shop, where they make roofs, lamps, water filters, etc., for the car service; and the machine shop, where they prepare the axles, bore out the wheels and cut bolts. There are in this latter shop 11 axle lathes, that will finish 50 axles a day; 3 wheel-boring machines, that will bore 125 wheels a day; hydraulic presses to force the car wheels on and draw them off the axles, the pressure going up to 40 tons, and also drilling, centering, bolt-cutting and nut-tapping machines. The car painting and upholstery shops are in another building, 363 by 73 feet, with four lines of rails that can accommodate 28 passenger cars. They also paint here all the station boards, mile and other posts and signs for the road. Here are also painted the canvas linings for the cars, some of which are highly decorated; while a large force work upon upholstery, mainly the making and repairing of cushions for car seats and backs.

There is a timber drying house, 65 by 30 feet, steam heat drying the timber, about 120,000 feet being dried every month. The lumber yard covers 12 acres, and contains great stacks and piles of the various kinds of timber, and with tracks leading to all of them, there being usually about 8,000,000 feet on storage, and 50 men engaged in handling it. A good deal of the storage is for finished parts of freight and passenger cars kept in stock and ready to put together when needed.

The engine house covers 105 by 28 feet, with a double Corliss engine of 250 horse-power, furnishing power for all the machinery in the various shops. A large yard is used for storing wheels and axles, and here the latter are tested by a heavy drop. There is also a fire engine house and a regular organized fire brigade among the workmen, with water plugs and hydrants distributed throughout the vast establishment. There are general offices and storehouses, and in these immense car-building works are employed about 1,900 men.

Physical Peculiarities of California.

Bishop Haven, writing to the *Christian Advocate*, gives his impressions of the great Pacific State as follows:

"California is the most mysterious of all the States I have yet seen; and I have traveled, more or less, in all but three. No brief description can give any adequate view of it. The cyclopedia pictures are, as usual, monotonous and cadaverous while the sketches by travelers often fall into the error of representing the whole as like some little spot that happened for a time to fill the eye. California is full of contradictions. To those who wish to study it before seeing it we would recommend two precepts, namely: 1. Believe all that you read and hear about it. 2. Believe nothing that you read and hear about it; for all is probably true of some place, and nothing is true of a majority of the places. It is 700 miles long, north and south, and nearly 200 east and west—an immense nation of itself. It is a land of mountains, some perpetually snow-clad, and of valleys and plains, in most of which snow is never seen—except at a distance—a land, some of which is as barren as Sahara, and which yet could furnish several Egypts fully as fertile as the original valley of the Nile; a land of corn and honey and wine; of oranges, lemons, plums, apricots, peaches, almonds, and English walnuts and apples; of potatoes and beets, and squashes and melons; of treeless and grassless prairies and dense jungles, and shrubs and trees that began to grow before the times of Noah, and seem never to have found a stopping-place; a land of coal and silver and gold; of grizzly bears, coyotes and gophers, and of men and women from all parts of America and Europe, and not a small sprinkling from Asia. Take it for all in all, it seems about impossible to write what is not true about it. Still we will not try, but, as usual, endeavor to keep within the limits of fact.

"One can see at a glance that California has mountain ranges extending crookedly north and south, with valleys and plains of various width between them. These are crossed by numerous passes and river courses east and west. Over all blow the west winds from the ocean, dropping their showers on the valleys and plains, and their snows on the mountains in the winter, and their water on the mountains in the summer.

"Sometimes in your travels you will find yourselves sweeping over immense plains like those of Illinois and Texas, only not like the former in being actually boundless to view, nor like the latter in the border of forest trees, but terminating in mountains on one side clad in snow. These plains sometimes will be covered with fenceless wheat-fields, the most prolific anywhere to be seen; in others, roamed over by cattle; in others, arid and useless; in others, broken into numberless orchards of every kind, and small farms; in others, covered with patches of forest; in others, narrowed down into valleys; in others, broken into hills and vales. The kind of agriculture suited to one place would be utterly useless in another.

"Thus, California, with the usual variety of soil, becomes just about the most mixed up and infinitely various country of its size probably anywhere on the round earth."

Webster Wagner.

The *Travelers' World*, a new and attractive semi-monthly illustrated paper which has just been started in New York, contains an interesting biographical notice of this gentleman, so extensively known as the inventor of the sleeping and parlor cars which bear his name. The following extract indicates the successive stages of improvement in the design and construction of these cars since the first ones were built 23 years ago:

"As soon as Mr. Wagner's plans were completed, Messrs. George B. Gates and T. N. Parmalee, of Buffalo, and Morgan Gardner, of Utica, associated themselves with him in his enterprise. Four cars were constructed at a cost of $3,200 each, and commenced running on the New York Central Sept. 1, 1858. The Hon. Erastus Corning, at that time President of the road, looked upon the scheme with great favor. But the first experiments did not prove as successful as was anticipated. The cars were provided with berths, each of which were provided with a pair of blankets, and a pillow, but the lack of ventilation rendered them close and suffocating, and effectually destroyed their usefulness. To remedy this evil the inventor's genius was at once taxed. In this first system the ventilators were opposite the sleepers, and with this arrangement it was not only difficult but almost impossible to leave them open at night, while the atmosphere became vitiated and the passengers stifled if they were closed. To obviate this, in 1859, Mr. Wagner adopted the elevated car roof, which immediately gave success to the enterprise, and which was found so valuable an improvement that it was at once applied, not only to the sleeping cars but to all traveling cars, to the increased comfort of the traveling world. Mr. Wagner himself looked upon it as so essential a feature for the comfort of passengers that he never applied for a patent, and was glad to have it used everywhere, believing that a contrivance which was so simple and at the same time so important should not belong to one man but to the world. The sleeping car rapidly developed from its crude beginning, and within two or three years each berth was furnished with a mattress and all necessary bedding, as well as with curtains to insure a desirable privacy. Such cars now cost from $16,000 to $17,000 each. The sleeping car had no sooner become an assured success than the inventor turned his attention to another department of comfort in traveling. He resolved to do for the day what he had done for the night, and in 1867 invented and put in operation his first drawing-room or palace-car. The new idea was everywhere eagerly welcomed, and the car at once became popular. It is now used on all the principal roads of the United States, and has not only made the fortune of the inventor, but is the greatest boon to the tourist. Several cars, built within the last few months, and now running on the Central road, far exceed in the luxury of their appointments the older cars. For while the cars of to-day, which are 66 feet long, are essentially like the original pattern, there is a constant variation in decorations and fittings."

The New England Car Clearing-House System.

The system of car accounting devised by Mr. E. B. Hill about four years ago, and which has been confined thus far to the railroads of the New England States, has proved so effective in keeping track of freight cars, that its merits are likely to lead to its adoption elsewhere. It is practically a clearing-house system for adjusting car mileage, with its headquarters in Boston, where upwards of fifty clerks are employed in the routine work. For information as to the movements of cars, the reliance is mainly upon conductors' reports in connection with junction reports, the former giving the number of each car in the train, the road to which it belongs, where it was received, and where and to what road delivered. This, with the junction reports, furnishes a history of each car so far as its daily travel is concerned, the returns being tabulated so as to detect any possible omission by the conductor of any particular train. The benefits of the system are of course confined to the roads included in the association, which includes nearly all in the New England States, although other roads outside of this territory are sometimes incidentally benefited. As an example, it is reported that the New York Central on one occasion claimed that 2,100 of its cars were on the Boston & Albany road; but instead of this being so, the clearing-house demonstrated the fact that at that time the whole number of cars on all the New England roads belonging to the New York Central did not exceed 700. The system has recently been extended to the roads of the Delaware & Hudson Canal Co., which comprise in all some 700 miles. For this purpose a clearing-house has been established in Albany, with the necessary corps of clerks; and it is not improbable that the merits of the system will at no distant day cause it to be more widely adopted for the adjustment of freight, ticket and car service balances.

THE Wells & French Co. is building 200 box cars, 20 tons capacity, and 33 ft. long inside, for the Wisconsin Central. They have M. C. B. standard axles and journal boxes. The Wason Company is also building for this road another passenger car with solid mahogany finish.

SOME new passenger cars on the West Jersey railroad, operated by the Pennsylvania, are thus described: The interiors are of light oak, the lines of carving in the simplest patterns and the seats upholstered in a plush that in color lies just between a maize and olive. There is no frescoing, gilding or paint or any other colors save the pale yellow oak and the soft yellow green plush. The effect is beautifully light and cool after the stifling monotony of red plush that has been so unchangingly adhered to for a generation of car builders. After looking into these ordinary passenger coaches no one cares to immure themselves in the heavy and glowing interior of the crimson-furnished Pullmans. The Pennsylvania railroad has achieved a remarkable success this last time, and Eastlake and all his disciples would have nought but praise for the simplicity, strength and fitness, and above all for the perfect chord of color in the interior finish of these new cars.

Table for the Valuation of Freight Cars.

CALCULATED ON THE BASIS OF THE MASTER CAR-BUILDERS' RULE NO. 17, BY JOHN ORTTON.

DESCRIPTION.	Eight-wheel Box Car, length 33 to 35 feet.		Eight-wheel Box Car under 32 feet. Ordinary Stock Car, length, 28 to 30 feet.		Eight-wheel Gondola Coal Car, 20 ton, drop or hopper bottom.		Eight-wheel ordinary Gondola Car with flat bottom.		Eight-wheel ordinary Flat Car, 31 feet long or over.		Eight-wheel ordinary Flat Car, 30 feet or under.		Percentages of new prices for cars, trucks or parts.
Age.	Value.	Annual depreciations.	Value.	Annual depreciations.	Value.	Annual depreciations.	Value.	Annual depreciations.	Value.	Annual depreciations.	Value.	Annual depreciations.	Per cents.
New	$575.00	.....	$550.00	.....	$525.00	.....	$450.00	.....	$460.00	.....	$425.00	.....	100.000
End of 1st year	540.50	$34.50	517.00	$33.00	493.50	$31.50	423.00	$27.00	432.40	$27.60	399.50	$25.50	94.030
" 2d "	508.07	32.43	485.98	31.02	463.89	29.61	397.62	25.38	406.46	25.94	375.53	23.97	88.360
" 3d "	477.59	30.48	456.82	29.16	436.06	27.83	373.76	23.86	382.07	24.39	353.00	22.53	83.059
" 4th "	448.93	28.66	429.41	27.41	409.89	26.17	351.34	22.42	359.15	22.92	331.82	21.18	78.075
" 5th "	422.00	26.93	403.65	25.76	385.30	24.59	330.26	21.08	337.60	21.55	311.91	19.91	73.391
" 6th "	396.67	25.33	379.43	24.22	362.18	23.12	310.44	19.82	317.34	20.26	293.19	18.72	68.987
" 7th "	372.87	23.80	356.66	22.77	340.45	21.73	291.82	18.62	298.30	19.04	275.60	17.59	64.848
" 8th "	350.50	22.37	335.26	21.40	320.02	20.43	274.31	17.51	280.40	17.90	259.07	16.53	60.957
" 9th "	329.47	21.03	315.15	20.11	300.82	19.20	257.85	16.46	263.58	16.82	243.52	15.55	57.300
" 10th "	309.71	19.76	296.34	18.91	282.77	18.05	242.38	15.47	247.76	15.82	228.91	14.61	53.862
" 11th "	291.12	18.59	278.46	17.78	265.81	16.96	227.83	14.55	232.90	14.86	215.18	13.73	50.630
" 12th "	273.65	17.47	261.76	16.70	249.86	15.95	214.16	13.67	218.92	13.98	202.26	12.92	47.592
" 13th "	257.24	16.41	246.05	15.71	234.87	14.99	201.32	12.84	205.79	13.13	190.13	12.13	44.737
" 14th "	241.80	15.44	231.28	14.77	220.77	14.10	189.23	12.09	193.44	12.35	178.72	11.41	40.052
14 years 297 days	230.00	11.80	220.00	11.28	210.00	10.77	180.00	9.23	184.00	9.44	170.00	8.72	40.000
		$345.00		$330.00		$315.00		$270.00		$276.00		$255.00	
Final value.....	40 per ct.	60 per ct.	40 per ct.	60 per ct.	40 per ct.	60 per ct.	40 per ct.	60 per ct.	40 per ct.	60 per ct.	40 per ct.	60 per ct.	

The Valuation of Freight Cars.

ST. THOMAS, Ont., August, 1881.

To the Editor of the National Car-Builder:

For the convenience of master car-builders and others who may have to make settlements for foreign freight cars destroyed on their roads, I have prepared the accompaning table of annual valuations of various classes of cars, based on the Master Car-Builders' rule No. 17, commencing with their established or assumed new values, and reducing them annually at the rate of six per cent. on their continuously depreciated values, until they reach the fixed limitation of 40 per cent., and the total sum of their depreciations amount to 60 per cent. of their new values, which occur in all cases when the cars reach the age of 14 years and 297 days, at which period depreciation ceases.

When a car is destroyed at an intermediate portion of any year, the valuation up to date is easily arrived at in the following manner: Multiply the whole amount of depreciation for that year by the number of months or days up to the time when destroyed, and divide the product by the total number of months or days in a year—12 or 365 as the case may require—and the quotient being deducted from the preceding annual valuation will give the current value.

As an example, suppose a car of the $550 series is destroyed when 3 years and 3 months old; to find its value? At the end of its third year it was worth $456.82, and the annual depreciation for the fourth year is $27.41, then

$$\frac{27.41 \times 3}{12} = \$6.85$$

hence, $456.82—$6.85 equals $449.97, the current value of the car at 3¼ years old.

Again, suppose a case of a similar class of car destroyed at the age of 5 years and 70 days; to find its value? At the end of the fifth year, the table gives the value of car as $403.65, and the annual depreciation for the sixth year is $24.22; then

$$\frac{24.22 \times 70}{365} = \$4.64$$

hence $403.65—$4.64 = $339.01, which is the value of the car at the age of 5 years and 70 days.

Appended to the table is a percentage column worked out to three places of decimals to show the depreciated value of 100, at the rate of six per cent. for 14 consecutive years and 297 days. By using the figures in this column, the depreciated values of any class, or part of car or trucks, can be quickly calculated for any given period.

To use this column, multiply the new value assigned to a car, or set of trucks, by the percentage opposite any given year, and the product will give the then current value. The value for any intermediate portion of a year will be found in the same way as shown in the examples given above.

Example: To find the values of cars at four years old, their original or assigned values being $550, $525, and $460, respectively. The percentage column shows that in four years 100 has, at the rate of six per cent. per annum, depreciated to 78.075; hence

$550 × 78.075 = $429.41 = value of car 4 years old.
525 × " = 409.89 " "
460 × " = 359.15 " "

JOHN ORTTON,
Canada Southern Railway.

Pennsylvania Railroad Fast Passenger Locomotives.

The one great attraction just now, and for some time past, at the Jersey City terminus of the Pennsylvania Railroad, is the new fast passenger locomotives recently built for service on the New York Division. The first one of the class was completed and commenced running in April last, and is known as "No. 10." A description of it was published in the CAR-BUILDER for May. The boilers are of the wagon-top pattern, and are 52 in. in diameter; fire-boxes 10 ft. long by 3 ft. 4½ in. wide; driving-wheels 78 in. in diameter; cylinders 18 x 24 in.; total weight 92,500 pounds; and length over all 57 ft. One peculiar feature is the extension of the fire-box backwards and flush with the door of the cab. This places the seats of the engineer and fireman about 3 ft. forward of the end of the boiler, and much higher than they are with ordinary boilers. The space occupied by the engineer is that commonly used for the sweep of the reverse lever. On this account this lever is dispensed with, and the reversing and valve gear operated by steam, by means of a small cylinder attached to the boiler just forward of the cab, with the piston-rod running backward near the side of the boiler. To this piston-rod is attached a graduated slide-bar which is connected with the valve gear forward, after the manner of the lower end of the ordinary reverse lever. This reversing and cut-off gear is worked by the engineer by the simple movement of a cock-lever and a small hand-wheel. The only apparent defect in this arrangement is, that the packing of the oil cylinders, being of vulcanized rubber, does not stand the test, but the defect will doubtless soon be remedied.

These engines make the run between Jersey City and Philadelphia (90 miles) in 1 hour and 55 minutes, schedule time, and with a train of six cars, one or two being drawing-room cars. Sometimes there are eight cars, but this makes too heavy a train for the desired speed. The wheels slip badly on the start, which make these engines unsuited for local trains and frequent stops; but when once under way they make good time, and their general performance is satisfactory, especially the fuel record, which shows a consumption of 9,500 pounds of coal for the round trip of 180 miles, while other engines consume from 12,000 to 13,000 pounds for the same distance. No attempt has been made to make extra fast time, but only to haul from six to eight instead of four coaches, as formerly by other engines. There are seven of these engines now in service, and three more will soon be completed. Thus far their performance has been satisfactory, but aside from a saving of fuel they do not appear to possess any special advantages over ordinary good passenger engines.

The Shop Foreman.

It would seem, at first glance, that a shop foreman should be the best general workman in the establishment, and this is undoubtedly desirable if one can be found with the other qualifications necessary to a good foreman; but this is not often the case. Let us see what combination of qualities the best general workman must possess to make him eligible as a foreman.

He must be a sober man who makes six days a week. He should have the confidence of his employers and the respect of the workmen. He should know how to manage as well as to command men. He must be able, in the shop at least, to entirely divest himself among the men of his old standard as a workman. He must be strictly impartial, and have the tact to find out the best way to get along with the men he has, and not those he would like to have. He must be able to plan ahead, have a good memory, a quick perception, be a rigid disciplinarian, and possess sound judgment; and because these qualifications are not often combined in the best workman is the reason why such a man is not always made foreman, and why the foreman is not always the best workman of the shop.—*Mechanical Engineer.*

As all know, the wooden part of a monkey-wrench handle will sooner or later split off, and turn an otherwise good tool into an unsightly looking and almost useless piece of old metal. All that needs to be done to prevent splitting is to recess the nut which holds the handle on the body of the wrench. It is suggested that those who manufacture such goods would do well to manufacture them in this manner,

Communications.

Rails and Wheels.

To the Editor of the National Car-Builder:

Much discussion has of late being going on among machinists and car-builders relative to the advantages of coning car and locomotive wheels. While some are inclined to follow the universal practice of coning wheels, others declare they can see no good in it. It is noticeable, however, that those who can see no virtue in the practice, always make coning a point when designing wheels for any kind of rolling stock. It may be superfluous to say that the object of coning wheels is to facilitate their passage around curves; but, in order to make the subject more clear, we may be pardoned for making mention of a fact which is patent to all practical railway men, Almost every one knows that there is an inch play between the wheel flanges and the rails. This, on tangents, would give room for some lateral and vertical oscillation, and may be regarded by some as objectionable on that account. If we build a track in a complete circle of 500 feet radius, and put a locomotive on it with 5 ft. 6 in. drivers, it would require one more revolution of the outer driver than of the inner one to get around the curve. Now, it is easy to see that if the locomotive keeps its flange against the outer rail it runs on its larger diameter and the opposite wheel runs on its smaller diameter, which facilitates its passage around curves.

Then here arises another question. If a light passenger train is running at a high rate of speed, the flange of the wheel is sure to follow the outer rail. In this case the benefit of the cone is obvious, but in case of a long freight train passing a sharp curve on a heavy grade, the power required to pull the train would draw the flanges of the wheels against the inner rail, especially the cars in the middle of the train. It is easy to see that a locomotive laboring hard with a freight train on a curve has a tendency to "straighten out the train." To do this, it must draw the flanges of the wheels against the inner rail, and here would be an obvious disadvantage of coning. But now let us reverse the state of affairs. Let the train be running on the same curve and grade in the opposite direction, and every flange in the train will be pressed against the outer rail. In this case it is difficult for many to see where there is any advantage in coning, inasmuch as the train running in one direction effects the outer rail, and that running in the opposite direction has a powerful friction on the inner rail.

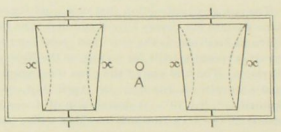
Then here comes in the proper elevation of the outer rail on curves. Some engineers claim that there is no advantage in super elevation of the outer rail, but the best roads on this continent have a rule for curve elevation, and long experience proves that elevation to a certain degree is not only desirable but an absolute necessity.

What may be called a mechanical absurdity is to make a wheel conical, and the rail flat on the surface, so that the wheel has no bearing on the rail except for a space of about half an inch on the inner side. This is all wrong. When a rail is placed in the track its whole surface should be exposed to the wear of the tread of the wheel. Rails are laid perpendicular, and present only their inner longitudinal surfaces to the wear of the wheel treads. This soon wears away the cone of the wheels, and some mechanics argue that inasmuch as the cone wears away there is no good in the plan. But look at the matter in its true light. There are cast iron, steel-plated frogs that have no bevel, and it only takes a short time to wear the cone from a wheel. Now, if the rails and wheels were made to conform to each other when new, the railway companies would not be subject to the expense of wearing out one-half the life of the track and rolling stock before they had rails and wheels near to perfection. One of the best railroads on this continent adzed the ties so as to incline the rails inwardly. This brought the tread of the wheels to a full bearing on the rail, as it should be, and it also gives full benefit of the coning. The idea that there is no good in the coning of wheels arises from the fact that they were cylindrical or straight so soon after being put to use. There are several causes for this which may be removed by the every-day practice of the car-builder and track man. The cone of the wheel is worn away by the brake-shoe, which is usually placed parallel to the axle, and not with the face or tread of the wheel as it should be. And again, the effect of sand and slipping, the sharp corners of frogs, and rails misplaced, all combine to destroy the cone.

As I have already said, there are circumstances under which a coned wheel is an advantage, and also when it is a detriment to a limited extent.

In running a long freight-train around a sharp curve and up a heavy grade, the flanges would be drawn against the inner side of the inner rail, and the wheel would be on its larger diameter where it should not be. On the New York elevated roads there are curves of very short radius. On these short curves the engineer has very properly increased the width of the gauge. This gives all the advantage possible to be gained from the coning of wheels. If we make wheels cylindrical, and run them around sharp curves, there is a powerful torsion on the axle, which in time amounts to crystallization and breakage. Investigation shows that it is better to cone the wheel and incline the rail inwardly than to lay the rail perpendicular with a coned wheel.

Any one who has any doubts as to the advantages gained by the coning of wheels may convince himself by a very simple experiment, which will be explained below. The writer once tried to convince an engineer that to cone a wheel was a proper thing to do. One argument presented was that a conical-shaped piece of wood, or any other substance, would run in a curve when passing down an inclined plane by its own gravity. But the engineer was not satisfied with the illustration, and made two cones and placed them in a rectangular frame, after the manner of axles in a car truck, and parallel to each other. He then placed his "truck" on an inclined plane, and expected to see it start off by its own gravity on a tangent. On the contrary, it did not run at all until the incline was elevated to an angle of 45 degrees. The reason is obvious. A single cone is not bound by connection with any other, but acts of its own gravity, and is not turned from its natural course by any hampering attachments, whereas, when two cones are confined in a rigid rectangular frame, as in the cut, one cone acts as a brake on the other.



The effect of thus placing two cones in a frame would be to cause the frame to rotate on a center if it were moved by force. The tendency of each one of the cones is to run in a curve to the left, but as there is a bearing the entire length of the cones, and as much friction at x, x, x, x, as at the ends, it is clear that a model constructed on this plan will not run either on a tangent or a curve, unless force is applied. But cut away the cones, as indicated by the dotted lines, so they will only have a bearing at the ends, then the model will run freely in a curve.

A very cheap and simple model of a truck may be made by taking a couple of empty thread spools of equal size, and plugging up the holes with soft wood. Then take a block of wood 3½ or 4 inches long, and as wide as the spools are long, get some cardboard or pieces of cigar-box, and tack to each side of the block, then, with toilet-pins for journals, running rather loosely in the side pieces, but held firmly by the spools, you have a miniature truck in running order. Place it on a table, and then raise the table so as to make an inclined plane, and your truck will move off gracefully in a tangent. Now, with a sharp knife reduce the circumference of the ends of the spools on one side, say ⅛ of an inch. This you can do by paring off ⅛ all round. Your truck will now run in a curve, the radius of which is decided or governed by the size of the spools and the difference in the size of the ends where they have their bearing on the incline.

From the foregoing it would seem that coned wheels would have many advantages over cylindrical treads, if such were put into use. The lateral motion complained of would certainly be much less in the former than the latter mentioned wheel. If a wheel were made with a straight tread, any lateral force throwing the locomotive or car from side to side by imperfections in the track, centrifugal force, or any of the causes which produce end-thrust of axles, there would be nothing but the friction on the rail to counterbalance the tendency to oscillation and shocks. Now, if a wheel is coned, and there is a weight of 5 tons on that wheel, there must be force enough added to raise 5 tons ⅝ in., or ¼ in., as the case may be. In this manner some of the natural forces have a tendency to counterbalance, or neutralize each other.

"Again," as the good man in the pulpit says, we will take the case of a locomotive, weighing 40 tons, standing on rails that are perfectly level and straight. The wheels on either side must, of course, bear a weight of 20 tons; we will also suppose that all the wheels of this engine are placed with their flanges an equal distance from the rail—that the lateral motion is equally distributed all around. We will now get this engine in motion, and after running it a distance we find all the flanges press against the rail on one side of the track. Some of the forces that combine to produce lateral oscillation have had extra labor to perform in raising 20 tons at least ⅝ of an inch. Now if the wheels had been cylindrical, these forces would have been relieved of this weight, and could have produced a powerful lateral shock; whereas, with the weight that must be raised, the lateral oscillation is reduced to a minimum. Secondly, on this latter proposition; place two pairs of wheels of equal weight (fitted to axles of course), one with coned wheels and the other with straight tread. We want to move these axles endwise so as to bring the flanges against the rail. In doing this we move the straight tread on a horizontal plane, and there is nothing to overcome but the natural friction, but when we come to move the coned wheels, we are moving a weight up an inclined plane. This is another instance of the extra force that is required to produce violent lateral oscillation when coned wheels are used.

Again, it is somewhat remarkable that if a train comes to a rest on a tangent, the flanges of every wheel in the train will, if measured, be found at the same distance from the rail on either side of the track. The measurement of thousands of wheels on track in good condition (on tangent), will show but trifling variation in the distance of the flanges from the rails. In some instances, where the treads of the wheels have been worn "concave," their flanges may be found "hugging" the rail; but with treads in good condition, it is seldom that a flange can be found pressing the rail on a tangent track. It was stated in the beginning of this article that one of the disadvantages of coning wheels was in case of heavy freights on sharp curves passing up heavy grades. This would obviously wear the inner rail, for the reason mentioned, namely, the tendency of the motive power to "straighten out the train." Now suppose the same train to be going in the opposite direction, at a greater velocity, as would naturally be the case, the centrifugal force would press the flange against the outer rail. But if the track is properly elevated, both rails will wear alike, and no damage result from the coning, as has been argued by many, and in one sense not altogether without reason. The principal difficulty is to get *any one* to look on both sides of a question in discussing matters of this kind. One gets an idea from a casual observation, and when once the idea becomes seated in his cranium, no amount of proof will change it. The persistent refusal of railway officials to accept facts for proof, has cost the railway community millions of dollars, but as this is a progressive age we may reasonably expect investigations at an early day that will demonstrate to a certainty the advantage in coned wheels, and rails laid inclined inwardly, so as to give a full bearing when new, and prolong the life of both wheels and rails at an immense saving to consumers of this costly property.

WM. S. HUNTINGTON.

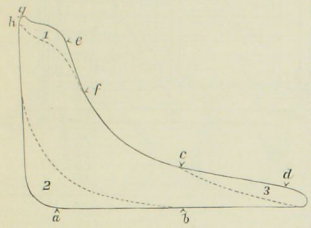
Locomotive Valve Gear—The Link Motion.

To the Editor of the National Car-Builder:

Perhaps the best way of illustrating the faults of the link as a cut-off device is by indicator diagrams. In the one herewith presented, two diagrams are shown, one over the other, as it were, for the purpose of comparison—one from a link engine (locomotive) of modern design, and the other from a riding-valve cut-off stationary engine. The atmospheric line is not shown, neither is the clearance line, as neither is necessary in comparing the actions of the valves. The unbroken line is from the stationary engine, and the dotted line

from the locomotive. In the former the steam is cut off at *e*, when expansion begins and continues until just before the piston reaches the end of the stroke, when the exhaust opens at *d* and the pressure falls. The exhaust is held open until the piston on the return stroke nearly reaches the other center, when at *a* the exhaust closes and compression commences, and owing to small clearances the exhaust steam is compressed up to *g*, slightly above the initial cylinder pressure, as is shown by the drop made, when the valve again opens.

In the card from the locomotive (dotted line) the steam follows the piston to *f*. The sudden falling



off of pressure from the start is due to the contracted opening of the port, and results in wire-drawing the steam from *h* to *f*. This contracted opening of the port when cutting off, or as it is sometimes aptly termed, "chawing off" close, is a fault that cannot be overcome in the link. An attempt to remedy the difficulty by means of long ports has been made, but signally fails, as is shown by the card, which is from a 16 × 22 cylinder with 15 in. ports. Long ports necessitate big valves, and big valves necessitate balancing, and as is well known, no *practical* balance valve for the locomotive has yet been invented.

From *f* the steam is expanded to *c*, when the exhaust opens, and the piston travels the balance, or nearly half, of the stroke with practically no pressure behind it. This is the second unavoidable fault of the link. On the return stroke the piston reaches *b*, when the exhaust is unavoidably closed and compression begins, the steam on the exhaust side being squeezed by the advancing piston from *b* up to *h*; that is to say, the pressure is piling up before the piston and tending to force it in the opposite direction, and this "prejudicial" pressure is constantly increasing, while the available pressure on the opposite side of the piston is as constantly decreasing, and the piston in the mean time must be kept in motion by the momentum of the train previously acquired. Compression is necessary in all engines, but in the link engine it reaches a degree of maximum, distortion and evil.

Comparatively, immense clearances are necessary in the link engine to keep the compression from mounting away above the chest pressure. In the riding-valve engine compression begins much later, at *a*, and extends a trifle above the chest pressure, filling the clearances with steam equal to the chest pressure; hence no live steam is needed when the valve opens to fill the clearance. The link does the same thing, but in doing so detracts from the power of the engine very seriously. Notwithstanding the link engine had an admission of two inches more of live steam than the riding-valve, the latter developed 36½ per cent. more work, as is shown by the additional areas 1, 2 and 3. Had the admissions been equal, it looks very much as if the riding-valve would have developed nearly 100 per cent. more work. Why it is that an improvement in the most vital part of locomotive economy is not made, certainly seems strange when so many inventors are beating about the bush with childish and unnecessary schemes. No automatic stationary engine builder would think of using the link, as with it economy is out of the question. Its only merit is simplicity, and this is purchased in its use at a very high price. Facts are facts, and the diagrams presented represent the average practice of automatic stationary engines and the locomotive. Both diagrams were taken from engines in daily use, and fairly represent the immense loss occasioned by the link.

It is said that Mr. Baldwin was very loth to adopt the link, and did so finally because the link became fashionable, and his customers wanted it. Mr. Brooks, of the Brooks Locomotive Works, is on record as saying:

"We all know that our link motion, unfortunately, is imperfect in this direction, and exhausts prematurely as we shorten the travel and work short cut-off. * * * Therefore, while with the ordinary cylinder (referring to the link-motion) we would exhaust at 14 inches on a cut-off of 7 inches. * * * There has been no improvement in the efficient economical working of steam in our locomotive cylinders since the introduction of the link motion, and even this was a step backward rather than forward, except to simplify the details of the valve motion. We all know it is not the proper way to work steam. We do not want to undertake to work it expansively, and let it go 10 inches from the end of the stroke."

The above is what Mr. Brooks thinks.

Railroad finances occasionally get into bad shape. General managers with almost autocratic powers are appointed and effect savings in all directions, but they inevitably allow their engines to use the link, and thereby burn 100 pounds of coal, when 55 or 60 pounds would, with a proper valve gear, perform the same work. The 17 and 18-inch link engines of to-day do not begin to compare with the little 15-inch riding-valve engines of 20 years ago, and the latter were not near as good as they might have been; that is, their valve motion, while far better than the link, might have been very greatly improved. It is a remarkable fact that in no type of engine under the sun, where economy is aimed at, is the link used, save in the locomotive, and it can only be accounted for by the further fact that master mechanics are as a rule too practical—graduates from the lathe and vise—who build link engines because their predecessors did, or it may be because they do not know how to build any other kind.

If railroads bought their engines, as do the large manufacturing establishments, on guarantees of specified economy, then the locomotive-building establishments would produce economical engines, and the competition would result, as it has in automatic stationary practice, in the highest practical economy. Like corsets, the link is injurious but fashionable.

FRANK C. SMITH, M. E.

English Railway Trains.

Mr. D. M. Yeomans, one of the English railway magnates who has been looking into the railway system of the United States, is reported as follows by an interviewer of the Boston *Herald*:

"Are the English railways generally well managed, Mr. Yeomans?"

"They are, and I think, with much greater economy than American railways. In point of great speed most of their express passenger trains make wonderful records for express trains. The rule in England is great speed and long distances between stopping places. The Great Northern Railway, which is the finest passenger railway in England, runs its express train through from London to Edinburgh, a distance of 400 miles, with only three stops, and make the distance in 8 hours and 45 minutes. The first 108 miles is run without a stop in 2 hours and 5 minutes. Now the average consumption of coal on one of their fast trains does not exceed 30 pounds to the mile, and for the section of 108 miles no water is taken in on the way, and only 2,800 gallons consumed on the way. When I gave some of your railway men these facts, they would scarcely credit it—they said it could not be done."

"What is the weight of these express trains, and how many passengers will they carry?"

"The average weight of these express trains—having about 18 coaches—is about 200 tons, exclusive of the engines. The average weight of the passenger coaches is in the neighborhood of 12 tons. There are five compartments in each coach, and there are three classes of coaches. In the first-class coach, which is finely fitted up, six persons are accommodated in a compartment, or 30 in all. In the second and third-class coaches, each compartment accommodates 10 persons, or 50 to a car. You can see from this that for the dead weight carried for each passenger, the English coaches are ahead of our American cars. The average length of the English railway coaches is 30 feet and the entrances are on each side, one to each compartment. Railway travel in Great Britain in the higher classes of cars is much dearer than in America; the cost of a first-class ticket from London to Edinburgh is £5 or $15, or about 4¼ cents a mile. The third-class fare in England is about equal to first-class fare in the United States."

"How are the coaches coupled?"

"Differently from American cars. They are secured or fastened together by screws—right and left screws—and these are tightened up until the buffers press strongly against one another. There are two buffers on each end of a coach, one on each side. These, while they press strongly against those on the coaches in front or behind, have yet spring enough to allow the coaches to easily turn curves, etc., but they do away with all sudden jolts in the stopping or starting of trains. By this method, however, the train is made practically one carriage. But this system of coupling has its disadvantages. A screw may be defective and break at any time. This is one of the reasons why the board of trade has insisted upon the railroads using automatic brakes, which, the moment a train would break in two, for example, would operate and put the brakes on the train."

"Do the English like this style of coaches?"

"They seem to. They are a very conservative people, and do not take readily to new things. Americans, who think their system of railway cars the best, wonder that some live Englishman does not introduce them into England on the railways there. But they have been introduced, and proved a dead failure. That is, the people would not have them. Some three years ago the Midland Railway put on American cars. People came to the station, looked at the cars, but wouldn't go in them. They went to their own coaches on the other roads and left the Yankee cars empty. Of course the Midland had to take them off its line."

Yard-Masters' Mutual Benefit Association.

The authorized report of the proceedings of this Association at its seventh annual convention, held at Milwaukee, in June last, shows that the organization is in a prosperous condition. The present membership is 422, which is an increase of 146 since 1877, or during a period of five years. The leading object of the association is to provide for the relief of the families of such of the members as may lose their lives or become totally disabled in their vocation, the funds for that purpose being raised in every case by an assessment of one dollar upon each of the members. Considering the hazardous nature of the duties performed in track-yards, the object is a most laudable one, and deserving of the utmost encouragement.

The proceedings, as published, relate mainly to routine business. The discussions are brief, and contain not a word in reference to safety appli-

STANDARD STOCK CAR—CHICAGO, BURLINGTON & QUINCY RAILROAD.

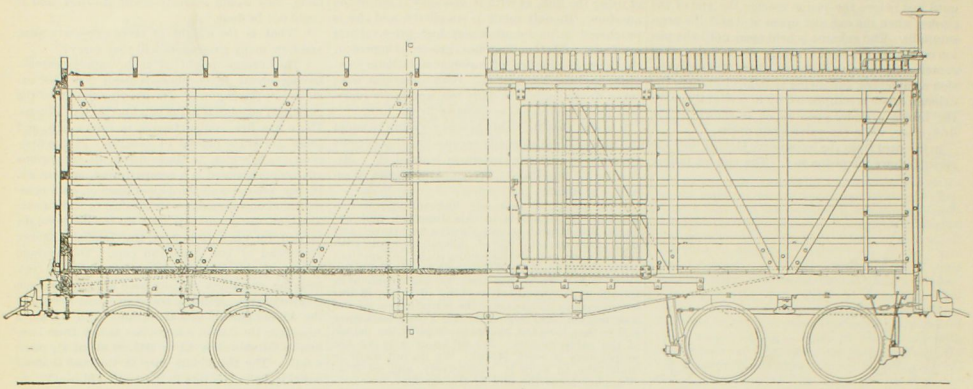


Fig. 1. Section at A. B. (Fig. 4) and Side Elevation.

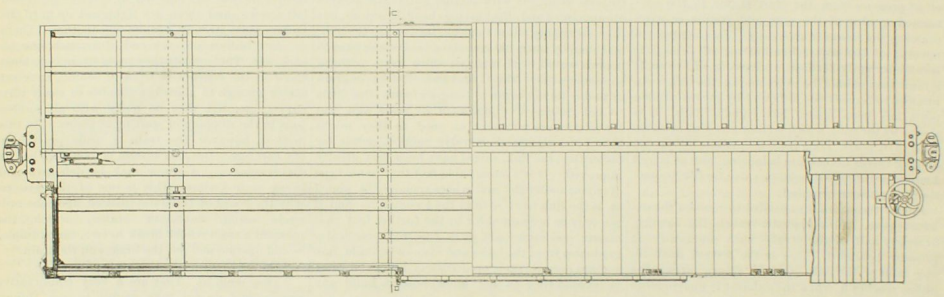


Fig. 2.—Plan of Floor and Floor Framing. Plan of Roof and Roof Framing.

ances in the construction of cars, or needed improvements for the better protection of train men. However important these may be in lessening the perils of track-yard service, it is obvious from what has occurred at one or two previous meetings that these matters had better be let alone as something outside the sphere of the association. They can not be discussed without giving rise to inevitable conflicts of opinion which are productive of no good, and are quite certain to impair the usefulness of the organization in its paramount object of providing relief for the afflicted and disabled.

An amendment was added to the constitution of the association, expelling and disqualifying for future membership any member who shall encourage or engage in labor strikes. A communication from a yard-master was also read, on the importance of greater uniformity in road signals, which was referred to a committee to be reported upon at the next meeting, which will be held in Baltimore on the second Wednesday in June, 1882.

THE Wilmington (Del.) *News* thus describes a new directors' car, completed by Bowers, Dure & Co., of that city, for the Norfolk & Western road: The exterior of the car is Tuscan red, striped and lettered in gold. The platforms are entirely surrounded with iron gates, and so arranged that they may be enlarged by throwing a movable floor over the steps. The car is supplied with a Westinghouse air brake, Janney's coupler, and two six-wheel trucks. Its interior is finished in unstained oak, after the Eastlake design, and is divided into four apartments, each of which is covered with beautiful Wilton carpet. Its windows are of embossed plate glass, and all are supplied with old gold satin curtains. The parlor, in which an elegant set of furniture will shortly be placed, contains a mirror 22½×36 inches. Joining this apartment are two complete state-rooms supplied with stationary beds, wash-stands, mirrors, etc. They are separated by a sliding door. In the rear of the state-rooms is a large double compartment, such as may be found in a Pullman sleeper. The bunks, when not in use, disappear in the ceiling, and are operated by machinery of a new pattern. When the beds are occupied they are covered on the sides with elegant Turkish-rug curtains, which depend from handsomely-burnished brass rods an inch in diameter. Under them are half a dozen seats covered with Persian silk plush. The other end of the coach is occupied as a culinary department, and complete it is in every particular. This room also contains a patent heater, the bronzed steam pipes of which are distributed in all parts of the car. The lights in the coach are attractive and uique in design. Two of them are what are known as four-light lamps, and are as costly as any ever placed in a railroad car. Among the numerous conveniences with which the car is supplied is an electric bell, having connections in each department.

To keep machinery from rusting take one-half ounce of camphor, dissolve in one pound of melted lard; take off the scum and mix in as much fine black lead as will give it an iron color. Clean the machinery and smear with this mixture. After twenty-four hours rub clean with a soft linen cloth. It will keep clean for months under ordinary circumstances.

A BRILLIANT black is produced on iron and steel by applying, with a fine hair brush, a mixture of turpentine and sulphur boiled together. When the turpentine evaporates there remains on the metal a thin layer of sulphur, which unites closely with the iron when heated for a time over a spirit or gas flame. This varnish protects the metal perfectly, and is quite durable.

To harden steel take two teaspoonfuls of water, one-half teaspoonful of flour, and one of salt. Heat the steel enough to coat it with the paste by immersing it in the composition; after which heat it to a cherry red and plunge it into soft water. If properly done, the steel will come out with a beautiful white surface. Stubs' files are said to be hardened in this manner.

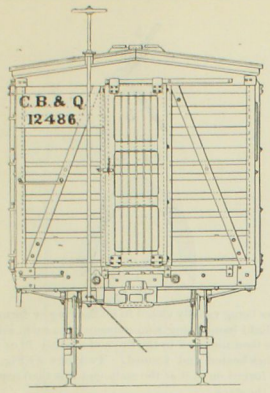


Fig. 3. End Elevation.

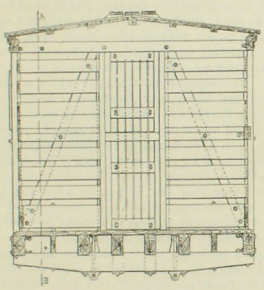


Fig. 4. Section at C. D.

Figs. 1 and 2.

The Chicago, Burlington & Quincy Railroad Company was among the first to increase its freight car loads, and it is now building all its box, flat and stock cars of the same general dimensions, and for a capacity of 40,000 lbs. The engravings and specifications given herewith illustrate and describe the present construction of its standard stock cars.

GENERAL DIMENSIONS.

Length of Body out to out of sills	30 ft. 6 in.
Width " " " "	8 " 9 "
Height top of sill to top of plate	7 " 1 "
" " floor to under carlins	6 " 10 "
Side Door opening	5 "
End " "	2 "

BODY TIMBERS, FINISHED SIZES.

Sills, hard Pine, 6 pieces	5	x	9	in.	x 30	ft.	
Side plates, " " 2 "	3	x	6	"	x 31	"	
Center Ribs, " " 1 "	2¾	x	3½	"	x 31	"	
Side " " " 4 "	1¾	x	2¾	"	x 31	"	
Band Molding, sides, hard Pine, 2 "	1¾	x	3¾	"	x 31	"	
Band Molding, ends, hard Pine, 2 "	1¾	x	3¾	"	x 10	"	
Running Boards, Pine, 2 "	2	x	6	"	x 16	"	
" " " 4 "	1	x	6	"	x 16	"	
Side and End Slats, hard Pine, 32 "	⅞	x	5¼	"	x 16	"	
Sign Board, clear Pine, 10 "	⅞	x	6	"	x 4	"	10 in.
" " " " 6 "	⅞	x	6	"	x 3	"	4 "
Brake Beams, Elm, 2 "	3¾	x	6	"	x 5	"	9 "
Roof, Pine, 500 ft. B. M. 1	x	6	"	x 14	"	0 "	
Flooring, hard Pine, 610 ft. B. M. 1¾	x	8	"	x 18	"	0 "	
End Sills, Oak, 2 pieces, 4¾	x	9	"	x 8	"	9 "	
Side and End Door Posts, " 8 "	3½	x	3½	"	x 6	"	10½ "
Corner " " 4 "	3¾	x	4½	"	x 6	"	10½ "
Side Posts, Oak, 8 pieces	2½	x	3½	in.	x 6	ft.	10½ in.
" Braces, " 16 "	2½	x	3½	"	x 8	"	0 "
Carlins, " 11 "	1¾	x	10	"	x 8	"	9 "
End Plates, " 2 "	2¾	x	13	"	x 8	"	9 "
Truss Plank, " 4 "	1¾	x	10	"	x 10	"	0 "
Draw Timbers, " 4 "	4½	x	7½	"	x 8	"	0 "
Dead Wood, " 2 "	6	x	8	"	x 2	"	0 "
Cross Ties, " 2 "	4	x	8	"	x 8	"	9 "
Cattle Bars, " 2 "	1¾	x	7½	"	x 6	"	0 "
" " Block " 2 "	3	x	5½	"	x 1	"	10 "
To bolt on Cross Ties, " 2 "	1¾	x	8	"	x 6	"	8 "
Ladder Post, " 2 "	1¾	x	2½	"	x 6	"	10 "
Door Stops, " 4 "	2	x	2¾	"	x 8	"	0 "
To fasten Brake " 1 "	1¾	x	3	"	x 2	"	6 "
For Doors, Ash. 4 "	1¾	x	4½	"	x 6	"	8 "
" " " 4 "	1¾	x	5	"	x 4	"	10 "
" " " 4 "	1¾	x	7	"	x 4	"	10 "
" " " 4 "	1¾	x	4	"	x 4	"	6½ "
" " " 4 "	1¾	x	4½	"	x 1	"	10 "
" " " 2 "	1¾	x	5	"	x 1	"	10 "
" " " 2 "	1¾	x	6	"	x 1	"	10 "
End Girts, Oak, 4 "	3½	x	3½	"	x 3	"	0 "
" " " 2 "	3½	x	3½	"	x 2	"	2 "

TRUCK TIMBERS.

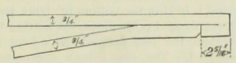
Swing Beam, Oak, 2 pieces, 9	x	9	in.	x	5	ft.	7 in.
Spring Plank, " 2 "	2½	x	9	"	x 5	"	3 "

CONSTRUCTION.

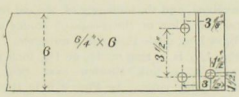
Side Sills.—Framed with double tenons 1⅛ in. thick, with 3 in. space between them; must have a relish of 1½ in. upon the outside, and be secured to end sills by 13-in. joint bolts, ¾ in. diameter.

Intermediate and Center Sills.—Tenons 5 in. wide, of same size and spacing as those on side sills; but without relish. Center sills spaced 9¼ in. apart in the clear, and secured by ¾ in. joint bolts, 21 in. long, passing through the end sills and dead wood. Intermediate sills spaced 39 in. apart in clear, and have no joint bolts.

Transoms.—Of double plate wrought-iron ¾ x 6 in. extending from out to out of side sills, center of transoms 4 ft. 8 in.



Elevation of Transom End.



Plan of Transom End.

from out of end sills, secured by ¾ in. bolts, one through each sill, and provided with C., B. & Q. standard center plates and side bearings.

The top plate of the transom to be bent over at each end forming a lip on under side 2 5-16 in. from the end, not welded, the joint of upper and lower bars to come between bolts, as shown in cut. The space between transom plates at center to be 6 in., or 7⅛ in. over all.

Cross Ties.—To be placed 6 ft. 1 in. apart in the clear, in center of body under the sills gained out 1 in. deep, to receive the sills to which they are fastened by ⅝ in. bolts. Saddle casting of C., B. & Q. standard pattern.

Draw-Timbers.—Each bolted to center sills with five ¾-in. bolts, three cast-iron keys, *a, a, a*, in joint of draw-timber and sill let in half and half in each; and all washers used under bolt-heads and nuts in bolting on draw-timbers, castings and bumper-blocks shall not be less than 2½ in. round or square, and made of no lighter iron than No. 8. A strap of wrought-iron 3 × ⅜ × 17 in. long is bolted under draw-timber at outer end and let in flush with bottom of timber for draw-bar to rest on. Draw-bar with yoke, straps, jaw-castings, buffer-plates and springs, to be of C., B. & Q. standard pattern; buffer-spring to be a 5½ × 8 double coil Dinsmore, with a capacity of 15,000 lbs. Center of draw-bar to set 33 in. from top of rail.

Truss Rods.—Two in number, of 1 in. round iron, with 1¼ in. upset ends, located immediately inside of intermediate sills; rest on cast-iron saddles on top of transoms, 8½ in. high, and on saddle castings under cross-ties, joined in center of car by ¾-in. bolts. Rods to be bent warm to a template, and made to fit properly in their places.

Post and Braces.—Post to have tenons, each end 1 in. thick and 11¼ in. long, and of same width as posts; mortises of corresponding size to be made in plate and sill 1 in. from the outside. All posts to have ⅝-in. rods, with screw threads at their ends, let in to side of post flush, passing through sill and plate, having wrought nuts and washers; washers to be not less than 2½ in. square or round, and to be made of no lighter iron than No. 8. Braces to have no tenons, but to be closely fitted, cut V shaped at their ends to form bearings on sills, plates and posts, the bearings on posts to be ¾ in., and to be secured by two ½-in. bolts to the bottom slat, and by one ½-in. bolt to the top slat, all as shown. Ends of car to have a 3½ × 3½-in. oak girt, fitted in across the end, 3 ft. 2½ in. from top of sill to bottom of girt; a ⅝-in. rod passing across from out to out of corner post, let in to said girt, flush with bottom, with wrought nuts and washers on each end.

Door Posts.—To have tenons in sill and plate same as other posts. To be rabbited out 1¼ × ⅞ in. to take slats, as shown in plan.

End Plates.—To have mortise, to take tenon 1½ in. thick and 1 in. long on side plate, to be secured by a ⅝-in. joint bolt, passing through the end plate and the sheet-iron corner-plate, said corner-plate being further secured by two ½-in. bolts, all as shown on plan.

Carlins.—Eleven, to be framed without tenons, resting simply on top of plate, gained down 1¼ in. at each end, and secured to the plate by two 30 pennyweight nails in each end.

Purlins.—Are let into end plates and carlins, two on each side and one in the center. Side ones fastened by 12 pennyweight nails to carlins and by 20 pennyweight nails to end plates. Center one nailed with 30 pennyweight all through.

Floor.—To be of 1¾ in. hard pine, 8 in. wide, matched, nailed to the sills with 30 pennyweight cut nails, two to each sill. The floor is to run out flush with outside of side sills, and to be slightly beveled at the top on the outside. Threshold plates of 3 in. × ¼ in. iron to be put down flush in side-door ways with countersunk screws of sufficient size. Threshold plates 3 in. × ½ in. on top of floor for end doors.

Ceiling.—This consists of a 1¾-in. oak plank, bolted to posts and braces, on the inside of car, set up from floor 1 in. by means of a cast-iron washer, between plank and floor. ⅝ in. bolts passing down through plank, washer and sill, and having nut and washer on bottom of sill. The upper part consists of 1 in. × 5¼ in. hard pine slats, the three lower rows being 2⅝ in. apart, with a space of 2½ in. between the oak plank and the lowest row. The three next courses or rows are put close together, no space left between them. The two top rows are placed with a space of 3½ in. between them and 3½ in. from bottom of plate. To be securely nailed to posts and braces with 8 pennyweight wrought nails. Top slats bolted with ½ in.-bolts. All as shown on plan.

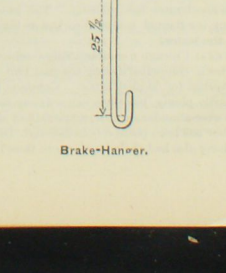
Band Molding.—Of 1¾ × 3¾ in. pine, secured by 40 pennyweight cut nails.

Roof.—Standard C., B. & Q. stock car roof, known as the Eaton roof, consisting of 1 × 6 in. guttered boards 4 ft. 8 in. long of clear pine, and 1 × 2¾ in. inverted guttered battens, secured to the band molding by two No. 16 3-in. wood screws, and to the purlins by six No. 16 2¼-in. wood screws in each batten. A coat of mineral paint is to be put on the inside of the battens and over the joint of the boards which the batten is to cover before the batten is screwed down. Paint two heavy coats of Parker's Cement Paint or Prince's Mineral in oil on top of the roof, last coat to be sanded.

Running Boards.—To be of one 2 × 6 in. board in center, and one 1 × 6 in. on each side of same, with 1 in. space between the adjoining boards. All to be supported on wooden brackets not more than two feet apart, in the clear, screwed firmly to the roof.

Trucks.—To be what is known as the Thielsen Patent Channel Bar Truck, with 33 in. double plate, narrow tread, wheels warranted to make four years time or 50,000 miles, accidents or sliding by brakes excepted. To have M. C. B. Axle, Box, Brass and Wedge; all as per plans attached; to have Hewitt box-covers. Springs to be the Davis patent, No. 420, two to each truck. King-bolts 1¾ in. diameter, 24 in. long, with head 3 in. diameter and ¾ in. thick, passes through transom and swing beam.

Brakes.—To be provided and attached to one truck. Brake beams of 3¾ in. elm, and hung by a 1 in. hanger, and to have ½ in. round iron safety chains. Brake hanger to be 55½ in. long from center of eye to center of hook, and made as shown in cut. For hanging inside brake beam, a piece of oak



Brake-Hanger.

4¾ × 9 in. to be put in between outside and intermediate sills, with tenons 1½ in. deep, and a ¾ in. rod, as shown in cut; this piece of oak to be spaced in same relation to truck as end sill is. Brake shoes to be of Congdon's patent (patent owned by the company), solid with brake head and of the pattern shown in cut, with face 1¾ in. thick. Top

of brake shaft not to extend over 11 in. above top of running board. Brake shaft of 1¼ in. round iron, held in a cast-iron bracket on top of roof and in a cast-iron step bolted to end sill. All as shown on plan.

Doors.—Side doors for 5 ft. openings to be made of 1¾ in. ash frames with (14) ⅝ in. rods to each door. End doors for 2 ft. openings and full height, to be made of 1¾ in. ash frames, with five ⅝ in. rods. All doors to have top and bottom slide brackets of C., B. & Q. standard pattern and to be hung on 2 × ⅜ in. wrought-iron slide rails at top and bottom; said rails being supported on cast-iron blocks bolted on to sill and plate, all substantially as shown in plan. The doors are to be provided with strong clasps and staples on the outside and pin hung by a chain. The clasp to be hung on the door stop and the staple with pin on chain on the door.

Cattle bars of 1¾ × 7⅛ in. oak to be provided for side door openings as shown on plan.

A plate of 3 × ¼ in. iron is also to be put in door way on top of the girt across end door of car.

Painting.—Body of car to have two coats of Parker's cement or Prince's mineral in oil. Irons and edge of roof to be blackened with lamp black in oil. C., B. & Q. in 10 in. Roman letters to be put on a sign-board 57½ × 25½ in. located on left of side door and 3 ft. 10 in. from top of sill to bottom of board. Number of car in 9 in. Roman figures to be put on sign-board under C., B. & Q. C., B. & Q., and number of car in 5 in. Roman letters and figures put on sign-board on each end of car on left side of end door, top of letters to be on level with C., B. & Q. on sides. Weight of car to be put in left hand lower corner on bottom plank, and division mark and year weight was taken, put in same corner on slat above bottom plank, all in 2½ in. letters and figures. Date when and where built, put on bottom plank in lower right hand corner of car, in 2½ in. letters and figures. Iowa and St. Louis & Rock Island division cars to have in large and small Roman letters, 4 in. and 3 in., the division mark put on upper slat of the three having no space between them, and just to the right of sign-board. All letters and figures to be in white and located as shown in attached sketch. Number of car to be stenciled in black on all four plates of car inside. Trucks to have one coat of lamp black in oil on the outside and one coat of mineral all over the inside.

Conclusion.—The car throughout is to be made of sound and perfect material. All lumber to be well seasoned, and all work to be put up in a substantial and workmanlike manner; and in all details of which no specific mention has been made herein, shall conform to the plans, or to sample car, or to both, furnished by the company.

The wheels, axles, and brasses are to be plainly marked with month and year when put under. This mark is to be stamped or prick-punched on the inside of wheel, and also on both ends of each axle, together with the initials of the maker of the axle.

Brasses are to be stamped on top in one of the recesses where the mark is not liable to be defaced.

THE Ohio Falls Car Co., at Jeffersonville, Ind., is building 10 new passenger cars and 100 sets of freight car trucks for the Louisville & Nashville road.

THE best way to keep ice in hot weather is to wrap it in a piece of dry flannel or carpet and place it on two sticks at the top of a basin or water jug. The main point is to keep it out of the water which accelerates the melting. The practice of wetting the flannel is almost as bad as leaving the ice in the water.

SEVERAL Chicago manufacturing establishments have been compelled during the past two months to advertise for skilled labor. Common labor is ordinarily plenty, but there can scarcely be said to be an over-abundance of it, while skilled mechanical labor has been positively in demand. Draughtsmen have also had their hands more than full.

Bill of Material and Labor for Grain and Open Stock Cars, Chicago, Burlington & Quincy R. R.

	One Grain Car.		One Open Stock Car.	
Lumber	4,538 ft.	$91.96	3,706 ft.	$74.44
Wrought iron	3,423 lbs.	80.07	3,328 lbs.	79.25
Cast iron	2,450 "	52.00	2,641 "	55.65
Nails	87 "	3.03	57 "	1.77
Lag bolts		1.20	7	1.17
Screws	10 gro.	6.00	10½ gro.	6.96
Split keys	16	.45	16	.44
Washers		1.53		1.67
Nuts	158 lbs.	5.70	158 lbs.	5.66
Carriage bolts	70	.60	76	.61
Chain	4 ft.	.20	4 ft.	.20
Coupling pins	24 lbs.	.84	24 lbs.	.84
Coupling links	21 "	.23	21 "	.73
Gas pipe	7 ft.	.63	7 ft.	.63
Channel bar iron	459 lbs.	13.76	459 lbs.	13.76
Axles	1,533 "	54.33	1,533 "	54.33
Wheels	8	102.12	8	102.12
Bolster springs	4	29.28	4	29.28
Buffer springs	2	3.28	2	3.28
Spring coulters	8	.04	8	.04
Journal brasses	8	12.48	8	12.48
Coal	900 lbs.	2.30	835 lbs.	2.07
Paint	93 "	7.00	93 "	7.00
Total cost of material		$469.53		$454.38
Carpenters, framing and erecting		33.50		31.50
Truck men, erecting		2.19		2.19
Machinists		5.38		5.38
Blacksmiths		15.60		15.60
Painters		2.74		2.19
Total Cost of Labor		$59.41		$56.86
Total Cost of Car		$528.94		$511.24

Improved Smoke-Stack Construction.

To the Editor of the National Car-Builder:

In the ordinary diamond-top stack the top part of diamond is held to the bottom by bolts passing through the flanged projections, the netting being held between the two flanges, and a joint made with red lead. This plan is both expensive, unhandy and unsatisfactory in every way, as the almost innumerable small bolts, the great amount of time involved, and the tendency of the red lead to get loose and allow of the escape of smoke at the joint, have long made this plan a nuisance.

In Fig. 1, *b* is a ring of 1⅛ or 1¼ inch angle iron, and *a* a link thrown over two lugs formed on this ring. In Fig. 2, *b* is the ring again and *a* the link. In Fig. 3, *a* is section of the netting, *b b* diamond, *d* one of four rivets in the top part to merely retain netting in position, and *c* a section of the angle iron ring. Fig. 4 is a full sized section of the ring when finished. The angle iron is first heated to a red heat for about 18 inches. It is then placed on a ring whose diameter is that of the diamond at its largest diameter, and whose section is the inside lines of Fig. 4. It is held to the ring by a pair of tongs at the end, and bent down on to the ring, the

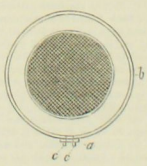


Fig. 1.

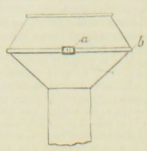


Fig. 2.

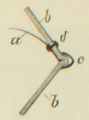


Fig. 3.

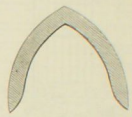


Fig. 4.

sides being rapidly closed in on the ring or former by light hammering simultaneously on each side. It is then removed to the fire and another 18 or 20 inches heated and formed. Two lugs, *c c* Fig. 1, are forged on to it at the ends, and it is then ready for the stack.

A clamp formed of two short bars with screws about 10 inches long, with square heads for a wrench, is placed over the lugs, which when loose on the stack stand about 6 or 8 inches apart, and the ring drawn tight on to the stack. The link *a* is then placed on to the lugs at their points, the clamp removed, and the link driven up to the ring. The lugs *c c* stand a little wider at their points than base to prevent the link from working off. Previous to placing the ring on the stack a little red lead is smeared on its inside to insure a tight joint. The flanges on the half diamonds are not over ¼ of an inch, barely turned out, in fact, to afford a surface to hold the netting between them. This ring can be put on a stack in less than five minutes, while it took hours almost by the old method of bolting, and it can be removed in a minute by knocking the link off the lugs. It makes a perfectly tight joint, and also adds a finish which is ornamental as well as useful. Several roads are using it, and their verdict is "perfection." It is not patented. It will be at once seen that the action of the edges of the ring on the inclined surfaces of the diamond tends to draw the two halves together.

FRANK C. SMITH, M. E.

THE Indianapolis & St. Louis shops, at Mattoon, Ill., have just completed a special car for the General Superintendent of the road. It was designed by Master Car-Builder G. H. Pratt, is handsomely finished and contains an office and sleeping-room, dining-room and kitchen, with all necessary conveniences.

THE Central Ohio R. R. Co. are building at their shops, at Marshalltown, Ia., 100 standard freight cars, in addition to rebuilding and current repairs. Their standard freight truck is a combination of wood and iron, and has 3½ × 6 journals, and Hewitt box lids. A new brick building will be erected for general offices this season, and a new car shop is also in contemplation.

THE Wabash, St. Louis & Pacific has just put on its line, to run between Kansas City and St. Louis, a new Pullman palace sleeping-car, which excels anything that has yet been produced in this line by Mr. Pullman. The name of the car is Bremen. Its interior is magnificently finished in light woods, highly illuminated in tasteful designs. At one end is a family room and at the other a bridal chamber, both furnished in the highest style of modern art and provided with all modern improvements. A new feature of these rooms is, that instead of berths they are provided with regular bedsteads, chairs, lounges, etc.

STANDARD FREIGHT CAR TRUCK—CHICAGO, BURLINGTON & QUINCY RAILROAD.

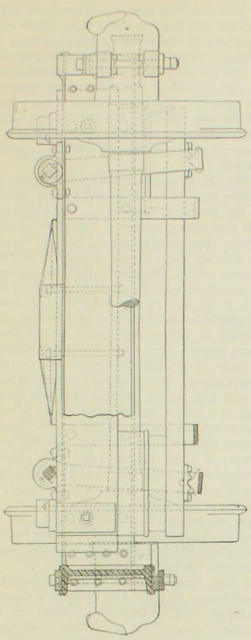


Fig. 1. Transverse Section and End View.

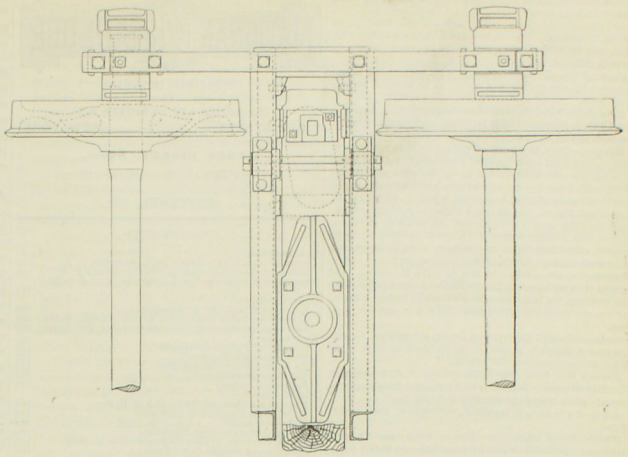


Fig. 2. Part Plan.

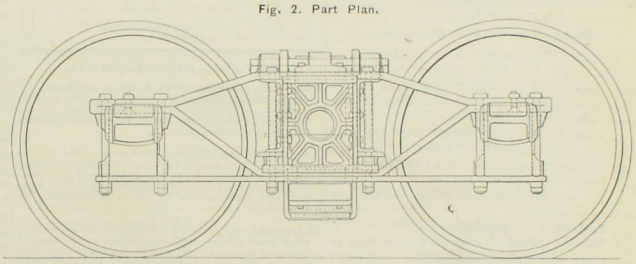


Fig. 3. Side Elevation.

The drawings illustrate the latest design of freight-car truck adopted and built by the above-named road. It is an improvement on the Thielsen channel-bar truck formerly used on the road as a standard, and is better adapted for carrying loads of 40,000 pounds, this being the capacity of the company's latest pattern of standard freight-cars. This improved truck is noted for its great strength and good construction, the lip on the arch-bar, large center plate, swing-hangers whose pins rock upon their bearings without sliding, and the addition of safety hangers.

DIMENSIONS.

Wheel Base	4 ft. 6 in.
Out to out of Arch-Bars	5 " 6¼ "
Out to out of Axles	6 " 11¼ "
Wheel gauge	4 " 8½ "
Out to out of Hubs	5 " 9⅝ "
Between faces of Journal Boxes	5 " 3⅝ "
Between centers of Journal Boxes	6 " 3 "
Between centers of Journals	6 " 3 "
Length of Journals	7 "
Diameter of Journals	3¾ "
Between centers of Arch-Bars	6 " 3 "
Between centers of Chafing-Plates	4 " 8¾ "
Between centers of Side-Bearings	4 " 7½ "
Between centers of Hanger-Pins	3 " 8 "
Between centers of Hanger-Pivots	3 " 11 "
Between centers of Safety-Straps	2 " 9 "
Between centers of Column Bolts	14 "
Between centers of Journal-Box Bolts	8½ "
Between faces of Channel-Bars	10¾ "
Top of track to top of Center-Plate	2 " 5 "
Top of track to top of Side-Bearings	2 " 5½ "
Top of track to top of Swing-Beam	2 " 3⅝ "

MATERIAL—IRON.

For Channel-Bars	2½	x	3½	x 10⅝ in.	6 ft. 6 in. long, 2 p's
" Top Arch-Bars	1½	x	3	"	5 " " 2 "
" Bottom Arch-Bars	1	x	3	"	6 " 8 " " 2 "
For Bottom-Straps	⅝	x	3	in.	5 ft. 5 in. long, 2 p's
" Hanger-Pins	1⅛	x	1⅛	"	1 " 8½ " " 2 "
" Hangers	⅝	x	3	"	3 " " 2 "
" Safety-Straps	⅝	x	3	"	4 " " 2 "
" Hanger-Eyes	1¼	x	4¼	"	7 " 4 " " 4 "
" King-Bolt, ro'd.			1¾	"	2 " 2 " " 1 "
" Bolts, round			1	"	17 " 7½ " " 1 "
" do "			¾	"	5 " 5½ " " 1 "
" do "			⅝	"	3 " 10½ " " 1 "

28 Rivets ¾ x 2⅛ for channel-bars and end castings.
8 do. ⅞ x 2½ " hanger castings.
8 do. ¾ x 1¾ " safety-straps.
8 do. ¾ x 1½ " chafing-plates.
12 Lag Screws ½ x 2½ in.
4 Split Pins ⅝ x 2¼ "
4 do. do. ⅝ x 2¼ "
4 Gas-Pipe Thimbles 1¼ x 19¼ in.
4 Wrought-Iron Washers 1¼ in. 3⅜, 2⅜ hole.
2 Axles, M. C. B. Standard.
4 Wheels, 33 in., narrow tread.
2 Davis' Patent Springs.

STANDARD C., B. & Q. CASTINGS.

2 End Castings.
4 Journal Boxes.
4 " Brasses.
4 " Keys.
2 Side-Bearings.
4 Chafing-Plates.
1 Center-Plate.
4 Hanger-Pin Bearings on channel-bars.
2 Hanger Bearings under Spring Plank.
2 Hanger Pivots " "

TIMBER.

Swing-Beams, oak	9	x	9	in.,	5 ft. 7 in. long.
Spring-Planks, "	2½	x	9	"	5 " 3 " "
4 Dust-Guards, pine	¾	x	6	"	9 " "

CONSTRUCTION.

Arch-Bars.—Top arch-bars to be 1½ × 3 in. iron, 4 ft. 10⅝ in. long after receiving an upward bend of 3¾ in.; each end to be secured to bottom arch-bar by a ¾-in. bolt with a sunken head on under side. The bottom arch-bar to be 1 × 3-in. iron, bent over at the end and forming a lip on upper side 3 13-16 in. from the end, not welded, the joint between the ends of the arch-bars to come between bolts, as shown, to be 5 ft. 6¾ in. long after receiving a downward bend of 9¼ in., which carries it down to the bottom strap. Both arch-bars to be bent to make an opening 16¾ in. long, and 13 in. high, for the channel-bars and end-casting. The end of both arch-bars, the journal-box and the bottom-strap to be bolted together by two 1-in. bolts, with double nuts.

End Casting.—To be of standard C., B. & Q. pattern, 16¾ in. wide at end under channel-bars, 19¾ in. wide between them and 13 in. high, with lips over both edges of both arch-bars. This casting, when inverted, forms the end-casting in trucks for low flat cars used in construction trains.

Channel-Bars.—To be 6 ft. 6 in. long and 10⅛ in. high, with top lip 3½ and bottom lip 2½ in. wide, and all of a uniform thickness of ⅝ in.; to be secured to each end-casting by fourteen ¾ × 2½-in. rivets, as shown; flanges of channel-bars to be supported by thimbles of 1¼-in. gas-pipe, 19¾ in. long upon the two column-bolts of 1-in. round iron, which bind the arch-bars, channel-bars, end-casting and bottom-strap all firmly together; bolts to have double nuts.

Bottom-Strap.—To be straight, and of ⅝ × 3-in. iron, 5 ft. long.

Safety-Straps.—To be ⅝ × 3-in. iron, secured to inside of each channel-bar by two ¾ × 1½ in. rivets riveted in the tapering holes of the straps.

Chafing-Plates.—To be ½ in. castings 4 × 8 in.; the two on channel-bars to be each secured by two ¾ × 1⅛ in. rivets riveted in the tapering holes of chafing-plates; the two on the swing beams to be fitted against a shoulder in the beam and each secured with a ½ × 2½ in. lag screw in center.

Swing-Beam.—To be oak 9 × 9 in. 5 ft. 7 in. long, so formed

at ends that in extreme side motion of car the swing-beam will strike body of end-casting and not the flanges; to be provided with chafing-plates, center plate and side bearings, as shown in drawings. Cars to be carried on center-plate with ¾ in. play between side bearings on car and truck; that is, ⅜ on each side.

Center-Plate.—To be 30 in. long, 2⅝ in. high above beam, to have a lip over each side of beam; to be secured by four ⅞-in. bolts.

King-Bolt.—To be 1¾ in. in diameter, 24 in. long, having a head 3 in. in diameter and ¾ in. thick; and to pass through transom and swing-beam.

Hangers.—To be U shaped, in one piece; of ⅝ × 3 in. iron, 21¾ in. long from center of hanger-pin hole to bottom inside of bend; the ends welded on, to be 4½ in. wide and 1¼ in. thick, with holes 1½ in. square punched diagonally to the length of hanger, for the hanger pin which is to be 1½ in. square and 20½ in. long, having 4 holes for split-pins 2¼ in. long, the outer ones to be ⅝ in., and the inner ⅜ in. thick, each to have a round washer ¼ in. thick and 3⅜ in. in diameter, with a hole 2⅝ in. in diameter; to be provided with hanger-pin castings having chilled wearing surfaces, and to be secured to channel-bars by two ⅝ × 2½ in. rivets. The bottom of swing-hanger to be provided with castings for pivots and bearings, the bearings to be fastened by four ½ × 2½ in. lag screws to an oak spring-plank 2½ × 9 in. and 5 ft. 3 in. long.

Springs.—To be 2 Davis patent freight car springs, No. 420, and placed obliquely across the spring-plank as much as the length of the spring-box will permit.

Journal Box, Brass and Wedge.—To be M. C. B. standard, with Hewitt cover. Bolt holes to be 8¼ in. from center to center. All brasses to be trued up and lead lined.

Axles.—To be M. C. B. standard, and made of first quality of iron.

Wheels.—To be double plate, narrow tread, and 33 in. in diameter; warranted to make 4 years time, or 50,000 miles, accidents or sliding by brakes excepted.

Master Car Painters' Association.

The 12th Annual Convention of this Association will be held in New York, beginning on Wednesday, September 21, with headquarters at the Metropolitan Hotel. The following subjects have beeen designated for discussion:

1. What are the adulterations employed, and the most simple methods of testing the qualities and detecting the adulterations in paint stock?
2. Inside finish of passenger cars.
3. The cause of varnish sweating, and the best method to prevent it.
4. Progress of car painting.
5. The best system of running a paint-shop, as to grading, rating and managing men; also keeping paint stock, brushes and other tools, serving them out, keeping a record of cars, etc.
6. Outside decoration of passenger cars.
7. The different formations of cracks in varnish, and the cause assigned to each.
8. Head-lining and inside decoration.
9. Locomotive painting.
10. The best and most economical material for, and the best method of painting, freight cars both old and new.

THE Woodruff Sleeping & Palace Car Co. have just placed eighteen new cars on different roads throughout the country, and have orders for about twenty-five more. The company has now nearly one hundred cars in use.

WORK is progressing actively on the shops of the new Southern Car Works Co., in Knoxville, Tenn. Mr. C. T. Case, late of Detroit, is Superintendent. The company expects to be ready to turn out cars by September.

A MAN in Jackson, Tenn., has preserved in alcohol a bed-bug which was caught in a bed that General Jackson slept in!

A FLORIDA railroad train passed a man on horseback, and there was great hurrahing among the passengers until it was discovered that the mule was tied to the fence.

"MR. CROW, what am your 'pinion of Sam Toby's character for honesty?" "Wal, as for Sam, I don't know nothin' about him. Some says he's honest and it may be so. I don't say he ain't honest. But this I do say: If I war a chicken, and Sam was about the yard, dis niggah would *high*, he would."

NATIONAL CAR BUILDER

PUBLISHED MONTHLY
BY
R. M. VAN ARSDALE,
5 DEY STREET.....NEW YORK.

JAMES GILLET, Editor.

L. E. WATERMAN, CORRESPONDING EDITOR.

SEPTEMBER, 1881.

CONTENTS.

EDITORIAL ANNOUNCEMENTS.

Addresses.—*Business letters should be addressed, and drafts and money orders made payable, to* THE NATIONAL CAR-BUILDER. *Communications for the attention of the Editor should be addressed* EDITOR NATIONAL CAR-BUILDER.

Advertisements.—*Nothing will be inserted in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.*

Contributions.—*Articles relating to railway rolling stock construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notice of changes in railroad officers, organizations and names of companies.*

SUBSCRIPTIONS *to the* CAR-BUILDER *will be received, and copies kept for sale, at the following places:*

A. WILLIAMS & CO., 283 *Washington Street, Boston, Mass.*

L. SCHAFFNER, *Cigar and News Dealer, Grand Pacific Hotel, Chicago, Ill.*

WILLIE H. GRAY, 306 *Olive Street, St. Louis, Mo.*

ROBERT CLARKE & CO., 65 *West Fourth Street, Cincinnati, Ohio.*

THE INCREASE OF FREIGHT CAR LOADS.

At the last meeting of the Car Builders' Association, there was a brief discussion as to the effect of the maximum freight car loads now carried, upon wheels, axle-journals and rails. Like most of the discussions upon topics suddenly sprung upon the members at these meetings, it was too discursive and rambling to be of much practical value. The drift of what was said, however, indicated pretty clearly that a very great increase has been made of late in the average car load, and that 20 tons is now the rule instead of 10 tons, as in former times. This doubling of the load applies, of course, to the heavier cars of more recent construction. The discussion as reported, contains little or nothing as to the effect of the increased weight upon the wheels, journals and rails, which was the point upon which information was asked for; and the inference is that no injurious effects have been observed, or some specific allusion would have been made to them. There was, in fact, both a tacit and outspoken admission that with steel rails, heavier engines, bigger journals, and improved road beds, there was no reason why 20 tons should not be considered a fair average car load; and it was furthermore admitted that the practice extensively prevailed of loading cars very much in excess of their present nominal capacity. The conservatism of ten years ago did not crop out at all, but some of the more progressive members confidently predicted that in a few years cars of 30 tons capacity would be running on our roads.

And why not, it may be asked, unless it can be shown that the additional size and weight would exceed the limits of economy? The object in building cars strong enough to carry 30 tons is to increase the proportion of paying load per car, as well as the carrying capacity of trains in proportion to their length. Supposing that the paying load of a train of a given length, made up of 30-ton cars, is no more in proportion to the amount of dead weight hauled than that of a train of the same length of 20-ton cars—which, by the way, we do not admit—there are other considerations which go to show that the heavier cars are the most economical. One of these carrying 30 tons would cost less in the building than two 15-ton cars, and the cost of maintenance would be considerably less in the matter of small repairs, paint, lubrication, leakage from oil boxes and the like, the number of brake appliances and other attachments would be lessened, and there would be a less number of cars in the aggregate to look after, to say nothing of lighter train expenses. It is obvious that these advantages would be increased with an increased carrying capacity, until a certain limit is reached, after which the margin of profit would diminish with the increase of load.

What that limit is can not be ascertained with any precision, as it must depend upon a variety of conditions and contingencies. Cars can be built strong enough to carry fifty tons and more too, but there is necessarily a limit to the weight than can be safely carried upon the present size of journals. If we assume that a car of 20 tons capacity weighs 11 tons, the weight on the journals of car and load would be about 56,600 pounds (wheels and axles, of course, not included), which would be about 7,075 pounds to each journal. This is certainly not excessive for a 3⅜ × 7 journal, when a 6½ × 7 locomotive driving-wheel journal carries 12,000 pounds, and even more. In case of the car journal, the margin of safety as to breakage is ample, and as to heating, there is now no special complaint. At all events, no allusion was made to it in the discussion to which we have referred. We believe the weight per wheel might be considerably increased over the above estimate without increased heating, if the lubrication was properly attended to. There is a maximum limit, however, which must be ascertained by experience, and when it is reached a larger journal will be in order, and ultimately, heavier rails and stronger bridges, or else there must be a limit to the carrying capacity of 8-wheel cars.

With respect to wheels, there should be a certain relative proportion between their diameter and the diameter of the journals. It has been demonstrated, we believe, by engineers who have investigated the subject, that a 33 inch wheel is a little smaller than it should be for a 3¾ in. journal, with due regard to the wearing and rubbing surfaces, weight of load, and factor of safety. So that in case the car load should be increased materially above the present maximum, a larger wheel might become necessary, especially if there should be a corresponding increase in the speed of freight trains. The iron wheels now in service, considering the weight put upon them, the mileage made, and the ordeal of severe winters, are certainly creditable to the makers and a great im-

provement upon those made thirty years ago. The discussion referred to revealed no weakness in the wheels under 20-ton cars, and the assurance was given by a prominent wheel maker that if railway men insisted upon having 30-ton cars, wheels adequate to the service would be ready for them—meaning, we suppose, 33-inch wheels.

FAST PASSENGER ENGINES.

There is a desire in this country for a type of passenger locomotive that will haul trains not exceeding 200 tons in weight, at the rate of 50 or 60 miles an hour, over good tracks, with no very heavy grades or sharp curves, and without any material increase of the present average running expenses and cost of track repairs. This, briefly stated, is what is wanted for fast passenger, mail and express service upon our leading railway lines. Whether engines can be devised of such improved construction as will meet this demand, under the conditions named, is a matter of a good deal of present uncertainty. The vastly increased working capacity of the locomotive since the advent of railroads has been due to improved construction. The principle of the machine is the same now as it was fifty years ago, and it is reasonable to suppose that unless the limit of development has actually been reached, there is still a margin for further improvment as respects greater speed with a given weight of train upon an adequate foundation of road bed and track.

Upon this problem the recent report of the Committee of the Master Mechanics' Association upon the "Best Form of Construction of Locomotives for Fast Passenger Service," throws some light. The report embodies a concise statement of the difficulties to be overcome, as derived from the experience of a number of the most capable members of that organization, and who seem to concur in the opinion that the running of fast trains with engines specially designed for the purpose is a kind of luxury which the passenger business of only a few roads in this country will justify. The reasons for this opinion are so plain that even a layman can hardly fail to appreciate their force. An engine with a single pair of driving-wheels not less than 6 feet in diameter, would seem to be the best adapted for speed—other things being equal—as compared with 4-wheel connected drivers. But the trouble is that the "other things" are not equal, nor is it at all probable that any amount of mechanical ingenuity can make them so. The lack of adhesion with single drivers necessitates light trains, or the drivers will slip in starting. If weight enough is put on them to secure the necessary adhesion at the start, it is too much for running, and although it can be reduced somewhat by a special arrangement for changing the bearings on the equalizing beams, it still exceeds the maximum limit of what a single wheel should bear—say 15,000 pounds—and in consequence of such concentration, is severe on the journals and track.

It is manifest that special engines for fast trains are not adapted to the varying conditions of service on American roads. We must have engines suited to the prevailing curves and grades, and capable of handling light or heavy trains as occasion may require. For this, the distinctively American type, with four coupled drivers not exceeding 6 ft. in diameter, cylinders 18 × 24 or 20 × 24, and a boiler of the utmost practicable steam-producing capacity, is undoubtedly the best. The weight is fairly distributed upon journals and track; there is sufficient adhesion for starting and for overcoming grades, the strength of the present standard rail is not overtaxed, and a uniform speed of 50 miles an hour with ordinary trains, say of 200 tons, can be maintained on tracks in average good condition. To accomplish anything more than this in regular express passenger service is not practicable without an increase of cost, or in other words, lighter trains and greater proportionate wear and tear of permanent way. Let these engines be taxed with no more work them the best engines were required to perform twenty years ago, and 60 miles an hour would be a very common-place performance. But since then their work has been doubled, with no change in gauge of track except to make it uniformly narrower, and thus prevent any lateral enlargement of fire-boxes upon which boiler capacity so much depends; and it must also be borne in mind that the amount of train resistance per ton at a speed of 50 miles an hour is more than twice what it is at 30 miles an hour.

There is a great deal of exceptional fast running on our roads with the most approved American type of engines of recent construction. Instances are constantly occurring of the attainment of speeds very much exceeding a mile a minute. These performances show what can be done on parade, and the time may come when they will cease to be exceptional and become the rule, but not until they are made remunerative. The element of cost can not well be ignored, and until the roads can see their profits in heroic running, the brakes will be applied a little in advance of the point where the loss begins. We want high speed for express service, passengers and mails, but not at the cost of running only half trains. The indispensable thing is not merely to run a mile a minute with two or three cars, but to do it with at least seven cars, including two or three sleepers. There are plenty of engines with four 5-ft. drivers that can get over a tolerably straight and level track as fast as prudent people wish to ride, but they must not destroy themselves and the cars and track too rapidly, or the traffic will not pay.

VALUATION OF FREIGHT CARS.

On another page will be found a very useful and convenient table of 8-wheel freight car valuations, prepared by Mr. Ortton, of the Canada Southern Railway, and based on Rule 17 of the revised code relative to settlements for cars destroyed in interchange traffic. The use of the table will be readily understood by the accompanying explanation. The calculations of yearly depreciations have been very carefully made, and their correctness verified by repeated tests. In the making of settlements under the rule, the convenience of these figures will be appreciated in the saving of time and labor and in avoiding liability to make errors.

NO VACATIONS FOR RAILWAY MEN.

The summer vacation season brings a brief respite from toil to the great majority of every class of workers except railroad men, the very ones of all others who stand most in need of the benefits of rest and recuperation. Their duties during the dog-day fervors are in no respect lightened, but rather augmented. If the freight movement is diminished somewhat in volume, as compared with what it is at other seasons, the difference is made up by the tide of summer passenger travel in all directions, stimulated by excursion fares, cut rates, and the devices of enterprising passenger agents in advertising the rural and picturesque attractions of the various lines. The passenger service must needs be kept to its highest standard of efficiency in order to meet the requirements of an exacting public. The strain upon the many grades of employés upon whose vigilance and fidelity every thing depends, is unintermitting. The faculties of mind and body must be kept in constant tension. Each and all are parts of a machine which becomes deranged in its general working by the least neglect in the matter of detail. Train dispatchers, engineers, conductors, telegraphers, flag and switchmen must be on the alert day and night; and then the hard-working, much-abused baggage men, whose patience and endurance during the season of pleasure travel, when nearly every road is literally a "trunk" line, fall little short of the miraculous. There is no summer vacation for these men. Their duties are, indeed, all the more arduous that others may go to the mountains and the sea-side for rest and enjoyment. Nor is it very much different with the higher grades of railway men, the executive officers and heads of departments, whose functions cannot be delegated to temporary incumbents without risk to the harmonious working of the subordinate parts. There is, in fact, no class of men that work harder than railroad men, or who stand more sorely in need of summer vacations, and whose opportunities for relaxation are so slight.

THE "BAGGAGE-SMASHER."

The best abused man in the entire fraternity of railway operatives is the so-called "baggage-smasher." In popular estimation he is, in his own particular sphere, a veritable Ishmaelite, as devoid of human sympathy and as little deserving of it as a wandering outlaw of the desert. He has no status in good society, and cares nothing for the proprieties or vanities of civilized life. His business is to toss packages about, break straps, knock castors from trunks, shake up their contents, and make a wreck of every thing he handles, with an impunity that is quite amazing. He never relents, well knowing that he would get no credit for yielding to a weakness so foreign to his vocation, and so he goes on making business for the trunk makers, and earning maledictions from the whole traveling community.

This is the way the thing looks to outsiders, who never think of weight in connection with a four-story Saratoga trunk, packed by hydraulic pressure until it is as heavy as a barrel of Portland cement. If these inconsiderate people would only exchange places with the baggage men for a day or two, and let the "smashers" look on while the grumblers do the work, there would probably be less occasion for fault-finding. The truth is, that in spite of popular prejudice there is really no class of railway men more deserving of commendation for the faithful performance of their arduous duties than those connected with the baggage department, and especially the men who do the handling. There are, no doubt, exceptional cases where baggage is roughly handled and banged about for the fun of the thing, but in the great majority of cases in which personal baggage is damaged more than what results from ordinary wear and tear, the fault is in the unnecessary and excessive weight put into the larger sized trunks, and which is out of proportion to the strength of the trunk frames. Aside from the mere handling, the numerous packages have to be classified for convenient delivery at all sorts of way stations with the least possible delay, and with no risk of mistakes. Much of this personal baggage is exceedingly valuable, and must be carefully watched to prevent loss and liability for damages.

There can be no question that the amount of personal baggage transported over the roads at all times, and especially during the season of summer travel, is far in excess of what there is any actual necessity for. But the road companies themselves are mainly to blame for this. Heretofore the limit of free transportation has been 100 pounds of baggage for each passenger, and this liberal allowance, instead of being reduced, has been extended to 150 pounds, and not very strictly adhered to at that, in view of the competition which exists between rival lines. But the present system is likely

to be kept up in spite of its inequality, as it affects both the roads and the public, and the obnoxious "baggage-smasher" is likely to figure even more conspicuously in the future than he has done in the past. But it is time that the prevailing impression in regard to his wanton and innate trunk-smashing propensities should be corrected, or at least modified, and his just deservings, as well as the arduous and responsible nature of his duties, more fully recognized.

RAILROAD MONOPOLY.

A conference of anti-monopoly agitators was held at Utica on the 18th of August to protest against the tyrannical exactions of railway corporations, and to arouse public attention to the importance of applying a remedy. These corporations, it is alleged, are so many baneful and wicked agencies seeking to concentrate wealth in the hands of a dominating privileged class, by controlling the channels of transportation, levying tribute on the productive industries of the country, corrupting legislation, and threatening to undermine the structure of the government itself; and all this is to be brought about by secret and cunning processes rendered doubly formidable by the resistless power of combination. And yet at the very moment these malcontents were promulgating this wretched demagogue trumpery, passengers were being carried, under their very noses, on the line of the New York Central railroad, from New York to Chicago, for $7, or for ⅗ of a cent. a mile, and grain and provisions at the rate of 15 cents per 100 lbs. from Chicago to New York. Although it may be said that these ruinous rates are the result of a suicidal war between the trunk lines, it is none the less cheap transportation. There is certainly no monopoly about it, and were it not for the gravity of the case, the respective attitudes of the agitators and the railroads would border on the ludicrous.

If railroad companies are monopolies, either singly or in local combinations, they are manifestly their own worst enemies, and may safely be left to work out their own destruction. So, at least, it would appear to a mere looker-on when a war of rates is in progress, each line underbidding its rivals regardless of the "cost of service" or "what the traffic will bear," throwing away profits by the million and prolonging a contest that might be avoided by a little mutual confidence in making and keeping agreements. The truth is, there is no monopoly, extortion or combination, nor is there likely to be. The utter absurdity of the charges put forth by the agitators must be apparent to every intelligent observer of the operations of trade and the relations of railway transportation with the present wide spread business prosperity. Some kind of regulation is certainly needed, not for the prevention of extortionate charges, but to insure rates that are fair, stable and reliable, with no risk of throwing the business of the country periodically into confusion. Low rates are not a benefit unless they are remunerative. Performing a service at less than its cost is sure to hurt somebody, and when the folly is perpetrated on a big scale it eventually hurts almost everybody, in spite of seeming or temporary advantages. The great rival lines will sooner or later have to regulate themselves so as to avoid mutual cutting, scalping and tomahawking, or else the time will come when they will be regulated from the outside. What this kind of regulation is likely to be can be gathered from the current utterances of the anti-monopoly leaguers, and the granger legislation seven or eight years ago.

THE entrance to the new six-story hotel in Denver is said to be so very wide that a man must be very drunk, indeed, who can't start from the opposite side of the street and hit it at least seven times out of ten.

The Tradesman, published at Chattanooga, Tenn., is, so far at we are aware, the only industrial trade journal in the South. It is conducted with an ability that can hardly fail to give a new impetus to the development of Southern resources. It will give special attention to the International Exposition, at Atlanta, Ga., which will open Oct. 5, and will publish complete and classified lists of parties engaged in industrial pursuits in the South, and forming a reliable directory of Southern industries.

The Railway Herald and Purchasing Agent is the name of a new monthly paper just started in Boston. Mr. George A. Schaffer is managing editor, and Mr. Frank T. Sivert business manager. The initial numbers are neatly printed, and contain an interesting variety of editorial and selected matter pertaining to railway and other departments of mechanical engineering and construction. The paper is to de changed at an early day from a monthly to a weekly publication.

The Elevated Railway Journal, in spite of the vacation season, is as spicy, varied and readable as ever. This is no reflection on the editor-in-chief, who is supposed to be luxuriating among rural scenes, but it shows that his assistants understand the ropes.

F. M. ATKINSON & CO. manufacture at their works at Melrose, on the line of the Northwestern R. R., ten miles from Chicago, all kinds of cast-steel car springs, including elliptics, Hebbard, round bar and other spirals. The tempering is by a peculiar process of their own which adds to the durable qualities of the springs, and renders them both light and strong. The shipping facilities of the firm are of the best, and the works have a maximum capacity for supplying 100 cars a day. They are the only works of a similar kind in Chicago, and may be regarded as a new industry, the successful development of which is due to the energy and perseverance of Mr. F. M. Atkinson, the leading member of the firm. The office of the firm is at 157 Washington street, Chicago.

THE TANITE CO., of Stroudsburg, Pa., has received from the Commissioners of the Sydney (New South Wales) International Exhibition, a beautifully engraved certificate of award, accompanied with a bronze medal, as a token of the superior excellence of the line of products manufactured by the company, the most prominent of which are its world-renowned emery wheels. It is a well-deserved tribute to American skill and enterprise. A similar award was received by the company not long since from the Geneva Exhibition, Switzerland.

THE FRENCH SPIRAL SPRING CO. (limited), of Pittsburg, Pa., has issued a beautifully illustrated and descriptive catalogue of its principal styles and patterns of railway car springs for bolsters, pedestals and equalizers. The cuts are one-quarter size and of superior excellence, showing the character of each spring to perfection. The steel plate representation of the miscellaneous group on last page of cover is worthy of a gilt frame.

Our Directory.

We note the following changes since our last issue. Readers are requested to give us prompt notice of changes when they occur:

Atchison, Topeka & Santa Fe.—Mr. C. C. Wheeler has resigned the position of Assistant General Manager of the Chicago & Northwestern to accept that of General Manager of the Atchison, Topeka & Santa Fe, in place of Mr. W. B. Strong, who has been elected President.

Atlantic & Pacific.—Mr. D. B. Sibley has been appointed Purchasing Agent, with office in Chicago.

Boston, Hoosac Tunnel & Western.—Mr. John N. Wellington has been appointed General Superintendent, with headquarters at Mechanicsville, N. Y.

Chicago, Burlington & Quincy.—Mr. F. C. Rice is appointed Superintendent of the Galesburg Division, in place of Mr. E. Ryder, who has gone to the Minneapolis & St. Louis.

Cincinnati, Hamilton & Dayton.—Mr. Lewis Williams has resigned as General Manager. Mr. Chas. M. Woodward has been appointed Purchasing Agent.

Flint & Pere Marquette.—Mr. Sanford Keeler, heretofore Superintendent, will hereafter have the title of General Superintendent. Mr. W. F. Potter is appointed Superintendent Eastern Division, and Mr. V. Meredith Superintendent Western Division.

Illinois Central.—Mr. T. J. Hudson is Superintendent of Chicago Division, in place of Mr. C. A. Beck, promoted to Assistant General Superintendent. Mr. Wm. Wilkinson succeeds Mr. Hudson as Superintendent of the Springfield Division. Mr. H. L. Frisbie is made Superintendent of the Middle Division in place of Mr. Wilkinson.

International & Great Northern.—Mr. Joseph Hurion is appointed Superintendent of the San Antonio Division, and Mr. R. B. Pegram Superintendent of the Gulf Division.

Lake Shore & Michigan Southern.—Mr. Charles Paine has resigned as General Superintendent. It is said the vacancy will not be filled immediately.

Louisville, Cincinnati & Lexington.—Mr. H. Middleton has been appointed Master Mechanic in place of Mr. A. Schaeffer, resigned. Mr. Middleton has held the same position on the main line of the Louisville & Nashville.

Michigan Central.—Mr. F. C. Nicholas is appointed Superintendent of the Western Division, in place of C. O. Wheeler, who has gone to the St. Paul, Minneapolis & Manitoba.

New Haven & Northampton.—Mr. C. A. Goodnow has been appointed Superintendent, with office in New Haven, Conn. Heretofore President Yeamans has been Superintendent also.

New York & Greenwood Lake.—Mr. George Hill has been appointed Master Mechanic, with office at Pompton Junction, N. J. He was recently in the Erie shops at Port Jervis.

Nevada Central.—Mr. F. W. Dunn, previously Assistant Superintendent, has been appointed Superintendent.

Peoria, Pekin & Jacksonville, and Springfield & Northwestern.—These roads will hereafter be operated as a part of the Wabash, St. Louis & Pacific.

Pennsylvania Company.—It is announced that Mr. Wm. A. Baldwin has accepted the position of Assistant General Manager. He is now General Superintendent of the Philadelphia & Erie Division, Pennsylvania Railroad.

Poughkeepsie, Hartford & Boston.—Superintendent J. A. Perkins will hereafter act also in the capacity of Purchasing Agent, in place of A. W. Cable, deceased.

St. Paul & Duluth.—Geo. H. Smith has resigned the position of General Superintendent, and E. Q. Sewall has been appointed to succeed him.

St. Paul, Minneapolis & Manitoba.—Mr. C. O. Wheeler has been appointed Superintendent of the Northern Division, in place of J. H. Sullivan, resigned. Mr. Wheeler has been on the Michigan Central.

Troy & Boston.—Mr. E. E. Aldrich, who has been Superintendent for the past two years, died in Troy, of typhoid fever, Aug. 11.

Wabash, St. Louis & Pacific.—Mr. George W. Stevens is appointed Superintendent of the Ohio & Indiana Division, with office at Ft. Wayne, Ind., in place of Mr. K. H. Wade, who has gone to the Chicago, Burlington & Quincy.

CONTINUOUS DRAW-BAR PATENTS.

The following circular has been issued by the Secretary of the Western Railroad Association:

CHICAGO, Sept. 9, 1880.

To the Members of the Association:

GENTLEMEN: Claims have been pending for several years that the Continuous Draw-Bar sold by the Continuous Draw-Bar Company under the Middleton and the Griffith and Patterson patents is an infringement of patent 71,580, granted 3d December, 1867 (reissue No. 8,095, granted 19th February, 1878), to Edward L. Caum.

This Association has continuously advised against entertaining this claim, but to quiet all questions, and at our instigation, the Continuous Draw-Bar Company has recently purchased the Caum patent, its owners inserting in the assignment a full and absolute release to all the members of the Eastern and Western Railroad Associations from any and all liability for, or on account of, any infringement heretofore of said patent.

Yours truly,
J. H. RAYMOND, Secretary, etc.

Directory of Master-Mechanics and Master Car-Builders

THROUGHOUT THE UNITED STATES AND CANADA.

References.—* Mechanical Engineer. † Mechanical Superintendent. ‡ General Master Mechanic. †† Gen. Master Car-Builder. § Master of Machinery. ‖ General Foreman. ** Supt. of Machinery. §§ Supt. of Motive Power and Machinery. ‡‡ Supt. Cars and Buildings. ¶ Supt. of Equipment.

A

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Adirondack	Jacob Myers	James J. Traver	Saratoga, N. Y.
Alabama Great Southern	M. J. Meehan	Geo. Hibbert	Chattanooga, Tenn.
Albany & Susquehanna	§§R. C. Blackall	R. C. Blackall	Albany, N. Y.
Albany & Susquehanna	C. A. Jones	J. R. Skinner	Oneonta, N. Y.
Arkansas Midland	J. B. Johnson	J. B. Johnson	Helena, Ark.
Asheville & Spartanburg	M. Fraser	W. B. Brown	Spartanburg, S. C.
Ashtabula & Pittsburg	Geo. J. Parkins	Wm. Marquis	Allegheny City, Pa.
Atchison, Topeka & Santa Fe	§§Geo. Hackney	‖Henry Hall	Topeka, Kan.
Atchison, Topeka & Santa Fe	A. C. Stiles		Pueblo, Col.
Atchison, Topeka & Santa Fe	C. Hackney		Topeka, Kan.
Atchison, Topeka & Santa Fe	John Fagan		Atchison, Kan.
Atchison, Topeka & Santa Fe	J. M. Smith		Kansas City, Mo.
Atchison, Topeka & Santa Fe	W. W. Wheeler		Emporia, Kan.
Atchison, Topeka & Santa Fe	E. H. Esterbrook		Nickerson, Kan.
Atchison, Topeka & Santa Fe	J. Q. Adams		Dodge, Kan.
Atchison, Topeka & Santa Fe	H. W. Somers		Raton, N. M.
Atchison, Topeka & Santa Fe	W. T. Allen		Las Vegas, N. M.
Allegheny Valley	G. W. Glass	R. Gunning	Pittsburg, Pa.
Atlanta & Charlotte Air-Line	C. D. Wall	C. D. Wall	Atlanta, Ga.
Atlanta & West-Point	Wm. Rushton		Atlanta, Ga.
Atlanta & West-Point		R. D. Cole	Newnan, Ga.
Atlantic & North Carolina	Basil Manly		New Berne, N. C.
Norfolk & Peter. Division	J. T. Robinett	J. T. Robinett	Petersburg, Va.
Virginia & Tenn. Division	F. Sterk	W. A. Morgan	Lynchburg, Va
Atlantic & Pacific	§§G. B. Simonds	G. B. Simonds	Albuquerque, N. M

B

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Baltimore & Ohio	§John C. Davis	L. Packard	Baltimore, Md.
Baltimore & Ohio	A. J. Cromwell, *Ass't M. of M.*		Baltimore, Md.
Baltimore & Ohio	I. N. Kalbaugh		Baltimore, Md.
Baltimore & Ohio	Wm. Edwards		Martinsburg, Va.
Baltimore & Ohio	Sam. Houston		Piedmont, Va.
Baltimore & Ohio	Robert Maxwell		Cumberland, Md.
Baltimore & Ohio	Chas. Hirsch		Wheeling, W. Va.
Baltimore & Ohio	S. B. Crawford		Grafton, W. Va.
Baltimore & Ohio	Alex. Laird		Parkersb'g, W. Va.
Central Ohio Division	O. B. Perkins		Zanesville, O.
Ohio & Chicago Division	§W. H. Harrison		Newark, O.
Central Ohio Division	E. L. Weisgerber		Newark, O.
Central Ohio Division	H. M. Ingler		Bellaire, O.
Lake Erie Division	And. Beckert		Sandusky, O.
Chicago Division	W. Y. Johnston		Garrett, Ind.
Chicago Division	F. J. Gunther		Chicago Junc., O.
Chicago Division	Geo. F. Wilson		Garrett, Ind.
Pittsburg Division	§John E. Sampsel		Connellsville, Pa.
Baltimore & Potomac	§§R. H. Soule		Baltimore, Md.
Bath & Hammondsport	Allen Wood		Ham'ondsp't, N. Y.
Bedford, Springville, O. & Bloom'd	Capt. Geo. Elliott		Bedford, Ind.
Bellefonte & Snow-Shoe	H. D. Landis	H. D. Landis	Bellefonte, Pa.
Bennington & Rutland	G. W. Blanchard		Rutland, Vt.
Boston & Albany	§§A. B. Underhill	J. B. Weston	Springfield, Mass
Boston & Albany		††F. D. Adams	Allston, Mass.
Boston & Albany	T. B. Purvis	J. E. Doran	Greenbush, N. Y.
Boston & Providence	George Richards	John Lightner	Roxbury, Mass.
Boston, Barre & Gardner	Chas. F. Brigham		Worcester, Mass
Boston, Concord & Montreal	Ralph Adams	L. D. Pickering	Lake Village, N. H.
Boston & Maine	Wm. Smith		Boston, Mass.
Boston & Maine		D. C. Richardson	Lawrence, Mass.
Boston & Lowell	J. F. Crockett	J. F. Crockett	Boston, Mass.
Boston & New York Air-Line			New Haven, Conn.
Boston, Revere Beach & Lynn	J. L. Folsom	John Coghlan	Boston, Mass.
Brunswick & Albany			Brunswick, Ga.
Burlington & Missouri River in Neb.	D. Hawksworth	D. Hawksworth	Plattsmouth, Neb.
Burlington, Cedar Rapids & Nor.	R. W. Bushnell	R. W. Bushnell	Cedar Rapids, Ia.
Burlington & Southwestern		A. B. Allen	Farmington, Ia.
Buffalo & Southwestern	J. G. Hubbard		Buffalo, N. Y.
Buffalo, New York & Philadelphia	Allen Vail		Buffalo, N. Y.

C

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Cairo & St. Louis	R. M. Pringle	R. M. Pringle	E. Carondelet, Ill
Cairo & Vincennes	A. Van Tuyl	A. Van Tuyl	Carmi, Ill.
California, Pacific & Northern	D. Rutherford	D. Rutherford	So. Vallejo, Cal.
Camden & Atlantic	Rufus Hill	S. Wills	Camden, N. J.
Canadian Pacific	†T. Irwin		Brockville, Can.
Canada Southern and Branches	*John Ortton	††John Ortton	St. Thomas, Ont.
Canada Division	‡W. A. Short	Robert Potts	St. Thomas, Ont.
U. S. Division	O. P. Dunbar		Grosse Isle, Mich.
Carolina Central	§Jas. Maglenn	S. R. Ethridge	Laurinburg, N. C.
Catasauqua & Foglesville	Tho. E. Evans	Chas. J. Holbach	Catasauqua, Pa.
Central of Georgia	D. D. Arden	R. M. Barthlemas	Savannah, Ga.
Atlanta Division	D. M. Gugel	Jas. A. Knight	Macon, Ga.
Central of New Jersey	Wm. Woodcock	George Hackett	Elizabeth, N. J.
Lehigh & Susquehanna Div	L. C. Brastow	L. C. Brastow	Wilkesbarre, Pa.
Central of Iowa	John Player	T. L. Seevers	Marshalltown, Ia.
Central Pacific	‡A. J. Stevens	††Benj. Welch	Sacramento, Cal.
Central Pacific		‖G. J. Turner	Sacramento, Cal.
Western Division	Geo. D. Welch	‖W. B. Ludlow	Oakland, Cal.
Visalia Division	S. Johnson		Tulare, Cal.
Sacramento & Oregon Div	M. W. Cooley	‖Phil. Douglas	Sacramento, Cal.
Truckee Division	Geo. Gregg	‖Wm. McPherson	Wadsworth, Nev.
Humboldt Division	W. F. Smith	‖J. C. Doughty	Carlin, Nev.
Salt Lake Division	Jas. Lamb		Terrace, Utah.
Salt Lake Division		‖A. Sherburne	Ogden, Utah.
Central Vermont	§§J. M. Foss		St. Albans, Vt.
New London & Northern Div.	I. W. Dow	S. O. Banks	New London, Conn.
Rutland Division	N. L. Davis	N. L. Davis	Rutland, Vt.
Chattaroi	W. C. Pendleton	Jos. Burley	Ashland, Ky.
Chesapeake & Ohio	§§John McFarland	J. N. King	Richmond, Va.
Chesapeake & Ohio	Tho. L. Chapman	H. C. Bassinger	Huntingdon, W. Va.
Cheraw & Darlington	John Bissett	W. H. Day	Florence, S. C.
Cherokee	C. E. Scruton		Cedartown, Ga.
Cheshire	F. A. Perry	F. A. Perry	Keene, N. H.
Charlotte, Columbia & Augusta		J. C. Troeger	Columbia, S. C.
Charleston & Savannah	H. A. Ulmo	J. D. Murphy	Charleston, S. C.
Chicago & Pacific	James Penny	C. N. Code	Chicago, Ill.
Chicago & Northwestern	** Geo. W. Tilton	††William Campbell	Chicago, Ill.
Iowa Division	J. O. Chapman	H. L. Preston	Clinton, Ia.
Peninsula Division	Geo. White		Escanaba, Mich.
Winona & St. Peters Div	W. A. Scott	W. A. Scott	Winona, Minn.
Chicago & Alton	§§Wm. Wilson		Bloomington, Ill.
Kansas City & St. Louis Div	J. T. Todd		Mexico, Mo.
Chicago, Burlington & Quincy	§§H. B. Stone		Aurora, Ill.
Chicago Division	W. D. Rowley		Aurora, Ill.
Galesburg Division	Robert Colville		Galesburg, Ill.
Iowa Division	Joel West		Burlington, Ia.
Iowa Division	C. W. Eckerson		Creston, Ia.
St. Louis Division	L. E. Johnson		Beardstown, Ill.
Chicago & Springfield	W. B. McKenna		Clinton, Ill.
Chicago, Clinton, Dubuque & Minn.	E. Smedley	E. Smedley	Dubuque, Ia.
Chicago, Rock Island & Pacific	‡T. B. Twombly	††B. K. Verbryck	Chicago, Ill.
Illinois Division	R. Biester	Samuel Pullman	Chicago, Ill.
Iowa Division	Jas. E. Morrill	Chas. M. Leonard	Davenport, Ia.
Keokuk & Des Moines Div.	S. W. Wakefield	Henry Kummer	Keokuk, Iowa.
Southwestern Division	R. O. Carscadin	Chas. R. Best	Trenton, Mo.
Iowa Division	J. G. Crockett		Stuart, Ia.
Chicago & West Michigan	Russell Booth		Muskegon, Mich.
Chicago & Eastern Illinois	Allen Cooke	Jas. T. Kerney	Danville, Ill.
Chicago & Iowa	H. S. Bryan		Aurora, Ill.
Chicago, Milwaukee & St. Paul	‡J. M. Lowry		Milwaukee, Wis.
La Crosse & P. Du. Ch. Div		John Bailie	Milwaukee, Wis.
Northern Division		Wm. E. Kittredge	Milwaukee, Wis.
Iowa & Minn. Division	J. O. Pattie		Minneapolis, Minn.
Racine & S. West Div	John Taylor	E. A. Eddy	Racine, Wis.
Sioux City & Dak. Div	J. H. Moulton		Yankton, Dak.
Dubuque Division	E. Smedley		Dubuque, Ia.
Chicago, Pekin & Southwestern	A. R. Overton		Joliet, Ill.
Chicago, Pekin & Southwestern		F. Shields	Streator, Ill.
Chicago, St. Louis & New Orleans	**W. H. Purdy		McComb C'y, Miss.
Chicago, St. Louis & New Orleans	E. D. Anderson		McComb C'y, Miss.
Chicago, St. Louis & New Orleans	J. M. Keith		Jackson, Tenn.
Chicago, St. Louis & New Orleans	J. F. White		Water Valley, Miss.
Chicago, St. Paul, Minn. & Omaha	F. W. Heintselman	‖J. W. Sidick	Shakopee, Minn.
Chicago, St. Paul, Minn. & Omaha		J. R. Reniff	Sioux City, Ia.
Cincinnati, Wabash & Michigan	S. B. Tinker	S. B. Tinker	Wabash, Ind.
Cincinnati, Hamilton & Dayton	James Eckford	W. H. H. Allison	Cincinnati, O.
Cin., Ind., St. Louis & Chicago	§J. S. Patterson	J. S. Patterson	Cincinnati, O.
Cincinnati, Richmond & Chicago	Wesley S. Brewer		Richmond, Ind.
Cincinnati Southern	J. Ivanson		Ludlow, Ky.
Cleve., Col., Cin. & Indianapolis	‡W. F. Turreff	W. F. Turreff	Cleveland, O.
Indianapolis Division	A. R. McAlpine		Brightwood, Ind.
Columbus & Cin. Division	W. L. Gilmore		Cleveland, O.
Cleveland & Marietta	Tho. Robertson	Tho. Robertson	Marietta, Ohio.
Cleveland & Pittsburg	§N. E. Chapman	N. E. Chapman	Cleveland, O.
Cleve., Mt. Vernon & Columbus	J. W. Holloway	J. W. Holloway	Akron, O.
Cleve., Tusc. Valley & Wheeling	Tho. Ranson		Lorain, O.
Cobourg, Peterboro & Marmora	Wm. Polson		Cobourg, Canada.
Columbia & Greenville	W. J. Parrish		Helena, S. C.
Columbus & Hocking Valley	I. G. Hutchins	J. M. Rockafield	Columbus, O.
Columbus & Toledo	I. G. Hutchins	J. M. Rockafield	Columbus, O.
Concord	J. T. Gordon	J. T. Gordon	Concord, N. H.
Concord & Portsmouth	J. T. Gordon	J. T. Gordon	Concord, N. H.
Concord & Claremont	**J. N. Lauder		Concord, N. H.
Connecticut River	§Wm. H. Stearns		Springfield, Mass.
Connecticut Western	John C. Barton		Hartford, Conn.
Conn. & Passumpsic Rivers	L. L. Brigham	L. F. Woodard	Lyndonville, Vt.
Corning, Cowanesque & Antrim	O. C. Patchell	O. C. Patchell	Corning, N. Y.
Cumberland Valley	A. S. Hull	G. W. Nitterhouse	Chambersburg, Pa.
Cumberland & Pennsylvania	N. W. Howson	Nathan Binnix	Mt. Savage, Md.

D

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Dak. So. & Sioux City & Pembina	J. H. Moulton	J. H. Moulton	Yankton, Dak.
Danbury & Norwalk	N. M. George	N. M. George	Danbury, Conn.
Danville & Southwestern	L. C. Hovey		Danville, Ill.
Danville, Olney & Ohio River	Louis Parisoe		Kansas, Ill.
Davenport & Northwestern	H. E. Woods		Davenport, Ia.
Dayton & Union	H. S. Gordon	H. S. Gordon	Dayton, O.
Dayton & Michigan	John Black		Lima, O.
Delaware, Lackawanna & West	Walter Dawson	Robert McKenna	Scranton, Pa.
Morris & Essex Division	W. H. Lewis		Kingsland, N. J
Morris & Essex Division		J. W. Baker	Dover, N. J.
Oswego & Syracuse Division	James Buchanan		Syracuse, N. Y.
Utica, Chenango & Susq. Div.	Tho. Thatcher		Utica, N. Y.
Bloomsburg Division	Charles Graham		Kingston, Pa.
Delaware & Chesapeake	Jos. A. Baynard		Easton, Md.
Delaware & Hudson Canal Co	**R. C. Blackall		Albany, N. Y.
Delaware & Hudson Canal Co		T. Orchard	Carbondale, Pa.
Rensselaer & Saratoga Div	J. L. Corey	Chr. Körner	Green Island, N. Y.
Denver Pacific	§R. McDougall	‖John Clock	Denver, Col.
Denver & Rio Grande	N. W. Sample	N. W. Sample	Denver, Col.
Des Moines & Fort Dodge	John McGrayel	E. A. Avery	Grand Junction, Ia.
Detroit & Bay City	R. P. Baillie		Bay City, Mich.
Detroit, Grand Haven & Mil	Fred Parker		Detroit, Mich.
Detroit, Lansing & Northern	G. C. Watrous	G. C. Watrous	Ionia, Mich.
Dorchester & Delaware			Cambridge, Md.
Dunkirk, Allegheny Val. & Pitts	J. C. Haggett	J. C. Haggett	Dunkirk, N. Y.

E

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
East Broad Top	G. A. Haggerty		Orbisonia, Pa.
Eastern	§§Amos Pilsbury	J. D. Billings	Salem, Mass.
Eastern	D. S. Wallis		East Boston, Mass.
Eastern Kentucky	D. L. Weaver	D. L. Weaver	Riverton, Ky.
E. Tennessee, Virginia & Georgia	C. A. Hodge,	Joseph Armbruster	Knoxville, Tenn.
Selma Division	B. J. Sitton	W. W. Pierce	Selma, Ala.
Alabama Cent. Division	Simon Gay	James Owens	Selma, Ala.
Ohio Division			
Macon & Brunswick Div	R. Wagnon		Macon, Ga.
Elizabeth City & Norfolk	J. S. Whitworth		Norfolk, Va.
Erie & Pittsburg	J. A. Wood	J. A. Wood	Erie, Pa.
Eureka & Palisade	J. M. Alson		Eureka, Nev.
European & North Am. (of Maine)	A. O. Bailey	A. O. Bailey	Mattawamke'g, Me.
Evansville & Terre Haute	John L. White	John L. White	Evansville, Ind.

F

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Fitchburg	§[illegible]o. A. Cooledge	J. W. Marden	Charlestown, Mass.
Vermont & Mass. Div	W. A. Foster		Fitchburg, Mass.
Flint & Pere Marquette	T. J. Hatswell	T. J. Hatswell	E. Saginaw, Mich.
Florida Central	James S. McElroy	James S. McElroy	Jacksonville, Fla.
Fort Wayne & Jackson	C. W. Hollister	C. W. Hollister	Jackson, Mich.
Fort Wayne, Muncie & Cincinnati	Wm. McPhail	Wm. McPhail	Fort Wayne, Ind.

G

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Galv., Harrisburg & San Antonio	§§D. T. Davis	‖Jas. Alexander	Harrisburg, Tex.
Galveston, Houston & Henderson	J. G. Conlon		Galveston, Tex.
Geneva, Ithaca & Sayre	J. N. Weaver		Waverly, N. Y.
Georgia	John S. Cook	T. M. Preval	Augusta, Ga.
Grand Haven	R. Booth	R. Booth	Muskegon, Mich.
Grand Tower & Carbondale	Hugh Smith	Hugh Smith	Grand Tower, Ill.
Grand Trunk	†Herbert Wallis	Wm. McWood	Montreal, Canada.
Grand Trunk	‖Warren Noyes		Gorham, N. H.
Grand Trunk		‖Duncan Menish	Portland, Me.
Chicago Division	†K. Blackwell		Battle Creek, Mich.
Grand Rapids & Indiana	J. M. Boon		Fort Wayne, Ind.
Grand Rapids & Indiana	‖J. R. Fish	‖J. R. Fish	Gr'nd Rapids, Mch.
Great Western, of Canada	†C. K. Domville		Hamilton, Can.
Great Western, of Canada	C. F. Hanson	Henry Childs	London, Ont.
Green Bay & Minnesota	‖Edw. Osborne		Green Bay, Wis
Gulf, Colorado & Santa Fe	Geo. B. Nicols	W. H. Martin	Galveston, Texas.
Gulf, Western Texas & Pacific	James Mooney		Cuero, Texas.

H

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Hanover Junction & Gettysburg	John J. Bingley	John J. Bingley	Hanover, Pa.
Hannibal & St. Joseph	Jas Long	Jas. Long	Hannibal, Mo.
Housatonic	N. Slingland	J. J. Ferris	Falls Village, Conn.
Houston, East & West Texas			Houston, Tex.
Houston & Texas Central	L. C. Noble	James McGee	Houston, Tex.
Huntingdon & Broad Top	Wm. Barkla		Saxton, Pa.

I

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Illinois Central	**S. J. Hayes	W. B. Snow	Chicago, Ill.
Chicago Division	Henry Schlacks		Chicago, Ill.
South Division	David Oxley		Centralia, Ill.
North Division	J. B. Edams		Amboy, Ill.
Iowa Division	Thomas W. Place		Waterloo, Ia.
Springfield Division	W. B. McKenna		Clinton, Ill.
Illinois Midland	J. G. Clifford		Paris, Ill.

Railroad.	Master-Mechanic.	Master Car-Builder.	Residence.
Illinois & St. Louis	J. H. Smith		Belleville, Ill.
Illinois & St. Louis		Charles Rothe	E. St. Louis, Ill.
Indianapolis, Decatur & Springfield	Pulaski Leeds	Pulaski Leeds	Indianapolis, Ind
Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Indianapolis & St. Louis	A. J. Sanborn	Geo. H. Pratt	Mattoon, Ill.
Indiana, Bloomington & Western	E. Riserodt	E. Riserodt	Urbana, Ill.
Ohio Division	Jos. S. Porter		Sandusky, Ohio.
International & Great Northern	R. H. Johnson	H. H. Sessions	Palestine, Tex.
Intercolonial	‡H. A. Whitney	Edw. Shaffer	Moncton, N. B.
Iron	Perry Scott	Clem. Roetling	Ironton, O.

J

Jacksonville, Pensacola & Mobile	J. P. Laird		Tallahassee, Fla.
Jeffersonville, Mad. & Indianapolis	Wm. Swanston	Edw. Austin	Jeffersonville, Ind.
Jacksonville, N. West. & S. East	B. J. Miller		Jacksonville, Ill.
Joplin	P. T. Butterly	P. T. Butterly	Girard, Kan.
Junction & Breakwater	J. A. Maguire		Lewes, Del.

K

Kansas City, Fort Scott & Gulf	J. S. McCrum	A. N. Montier	Kansas City, Mo.
Kansas City, Lawrence & South'n	J. S. McCrum		Kansas City, Mo.
Kan. City, St. Jo. & Coun. Bluff	F. A. Chase	Thos. Aylesbury	St. Joseph, Mo.
Kansas Central	Wm. McCall		Leavenworth, Kan.
Kaw Valley Division	James Long		Armstrong, Kan.
Smoky Hill Division	John B. Daily		Ellis, Kan.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knox & Lincoln	Wm. A. Field	C. L. Turner	Bath, Me.

L

Lake Erie & Western	¶H. L. Cooper		Lima, Ohio.
Lake Ontario Southern	Geo. Thompson	Wm. Currier	Sodus Point, N. Y.
Lake Shore & Michigan Southern	†James Sedgley	††John Kirby	Cleveland, Ohio.
Michigan Southern Division	Geo. W. Stevens		Elkhart, Ind.
" "		Frank O. Bray	Adrian, Mich.
Toledo Division	J. M. Sanborn	W. O. Smith	Norwalk, Ohio.
Erie Division	L. O. Gassett	J. Withycombe	Cleveland, Ohio.
Buffalo Division	J. S. Graham	A. C. Robson	Buffalo, N. Y.
Lehigh Valley	John I. Kinsey		South Easton, Pa.
Lehigh Valley	P. Hofecker		Weatherly, Pa.
Lehigh Valley	John Campbell		Delano, Pa.
Lehigh Valley	D. Clark		Hazleton, Pa.
Lehigh Valley	A. Mitchell		Wilkesbarre, Pa.
Lehigh Valley		Jno. S. Lentz	Packerton, Pa.
Little Rock & Fort Smith	James Eblin	James Malone	Argenta, Ark.
Little Rock, Miss. River & Texas	Joseph Taylor	Joseph Taylor	Arkans's City, Ark.
Los Angeles & Independence	Jas. Velsir	J. S. Young	Los Angeles, Cal.
Louisville, New Albany & Chicago	Geo. H. Ruhlandt	Geo. H. Ruhlandt	New Albany Ind.
Long Island	Jas. Thompson	Jas. Thompson	L. Isl'd City, N. Y.
Louisiana Western	B. B. Harrop		Vermilionville, La.
Louisville, Cincinnati & Lexing'n	H. Middleton		Louisville, Ky.
Louisville & Nashville	**Reuben Wells	H. Middleton	Louisville, Ky.
Nashville & Decatur Div	W. H. Thomas	J. P. Furguson	Nashville, Tenn.
South & North Ala. Div	C. W. White		Birmingham, Ala.
St. Louis Div	Thos. Walsh	W. H. H. Price	Mt. Vernon, Ill.
Clarksville Division			Bowling Green, Ky
Memphis & Ohio Div	Wm. Pike		Memphis, Tenn
Mobile & New Orleans Div	Wm. Adair		Mobile, Ala.

M

Maine Central	J. W. Philbrick	J. W. Philbrick	Waterville, Me.
Maine Central		C. H. Kenison	Augusta, Me.
Manchester & Lawrence	J. T. Gordon	J. T. Gordon	Concord, N. H.
Manhattan Beach			Bay Ridge, L. I.
Manhattan Elevated	T. W. Peeples	H. A. Webster	New York, N. Y.
Marietta & Cincinnati	E. M. Bosley	E. M. Bosley	Chillicothe, Ohio.
Marquette, Houghton & Onton'gn	W. H. Williams	H. D. Lyons	Marquette, Mich.
Memphis, Paducah & Northern	G. M. Taylor	G. M. Taylor	Paducah, Ky.
Memphis & Little Rock	Thos. Rennell	P. P. Twitchell	Argenta, Ark.
Memphis & Charleston	§H. N. Burford	J. J. Kasey	Memphis, Tenn.
Mexican National	J. C. Munro		City of Mexico.
Michigan Central	S. H. Edgerly		Jackson, Mich.
Michigan Central		††Robert Miller	Detroit, Mich.
Midland of Canada	†Wm. Marling		Port Hope, Ont.
Milwaukee, Lake Shore & West'n	S. Charnley		Manitowoc, Wis.
Minneapolis & St. Louis	Tho. Downing	Tho. Downing	Minneapolis, Minn.
Mineral Range	George F. Coon		Hancock, Mich.
Mississippi Tennessee	J. C. Ramsey	S. J. Bolton	Memphis, Tenn.
Missouri & Western	A. C. Persing		Pierre City, Mo.
Missouri Pacific	§§John Hewitt	John Hodge	St. Louis, Mo.
Missouri Pacific	R. D. Grant		St. Louis, Mo.
Missouri Pacific	Geo. W. Walshe		Sedalia, Mo.
Missouri Pacific	H. V. Faries		Atchison, Kan.
Mobile & Montgomery	C. W. White	Lewis Barham	Montgomery, Ala.
Mobile & Girard	J. C. Albrecht	A. J. Nix	Columbus, Ga.
Mobile & Ohio	R. H. Briggs	J. T. Booth	Whistler, Ala.
Mobile & Ohio	John Fitzgerald		Macon, Miss.
Mobile & Ohio	M. T. Carson		Jackson, Tenn.
Montgomery & Eufaula	D. M. Gugel	James A. Knight	Macon, Ga.
Morgan's Louisiana & Texas	N. Tilton	Wm. O'Brien	Algiers, La.

N

Nashua & Lowell	S. A. Davis	S. A. Davis	Nashua, N. H.
Nashville, Chattan'ga & St. Louis	James Cullen	J. G. Sawyer	Nashville, Tenn.
Naugatuck	Henry Hanford	George W. Gray	Bridgeport, Ct.
Nebraska	D. Hawksworth		Plattsmouth, Neb.
Nevada Central	Z. T. Sprigg		Battle Mountain, Nev.
Newburg, Dutchess & Connecticut	W. J. Vanbuskirk		Dutchess J'n, N. Y.
New Brunswick	Jesse Mathews	T. N. Burpee	Gibson, N. B.
New Brunswick & Canada	Tho. Armstrong	G. Houlton	St. Andrew's, N. B.
New Haven & Northampton	Henry Fox	John Sweeny	New Haven, Ct.
New Jersey & New York	J. S. Drake		Jersey City, N. J.
New Jersey Southern	Rufus Blodgett		Manchester, N. J.
New York, Lake Erie & Western	§§F. M. Wilder		Susquehanna, Pa.
New York, Lake Erie & Western	J. H. Vreeland		Jersey City, N. J.
New York, Lake Erie & Western		J. N. Mileham	Jersey City, N. J.
New York, Lake Erie & Western	J. Van Vechten	J. Van Vechten	Port Jervis, N. Y.
New York, Lake Erie & Western	V. Blackburn		Susquehanna, Pa.
New York, Lake Erie & Western		D. B. Goodell	Elmira, N. Y.
New York, Lake Erie & Western	George H. Griggs		Hornellsville, N.Y.
New York, Lake Erie & Western	G. B. Ross	M. Wilder	E. Buffalo, N. Y.
New York, Lake Erie & Western	Jas. Brady		Rochester, N. Y.
New York & Harlem	Theo. Wheeler		New York, N. Y.
New York Central & Hud. River	§§Wm. Buchanan	C. E. Garey	Morrisania, N. Y.
New York Central Division	§§G. B. Van Vorst	††Leander Garey	New York, N. Y.
New York Central Division	§§Henry Watkeys	D. Holt	West Albany, N.Y.
New York Central Division	§§Amos Gould	E. A. Olmstead	Syracuse, N. Y.
New York Central Division	§§S. L. White	Richard Donaldy	E. Buffalo, N. Y.
Hudson River Division	§§Wm. Buchanan	Peter Smith	Niagara Falls, N.Y.
New York Central Division		C. H. Burchard	New York, N. Y.
New York, Ontario & Western	Edw. Minshull	Edw. Minshull	E. Rochester, N.Y.
New York & New England	§§Geo. E. Bryden	Elias E. Pratt	Middletown, N. Y.
Norwich & Worcester Div	Richard Colburn		Boston, Mass.
Hartford Division	E. M. Humstone	S. Howland	Norwich, Ct.
New York, N. Haven & Hartford			Hartford, Conn.
New York & New Haven Div	§§H. Kettendorf	James Denver	New Haven, Conn.
Hartford Division	§§Jno. Heaney, Jr.	John Heaney, Jr.	Hartford, Ct.
New York, Penn. & Ohio	†William Fuller	††Wm. Fuller	Cleveland, O.
New York, Penn. & Ohio	J. A. Cooper	D. S. Dockstader	Meadville, Pa.
New York, Penn. & Ohio	N. Wright	W. G. Huggard	Cleveland, O.

Railroad.	Master-Mechanic.	Master Car-Builder.	Residence
New York, Penn. & Ohio		S. V. Smith	Kent, O.
New York, Penn. & Ohio	William Hill	J. W. Holmes	Galion, O.
New York, Penn. & Ohio		J. T. Fosdick	Salamanca, N. Y
New York, Penn. & Ohio		Geo. Wilson	Dayton, O.
N. York, Susquehanna & Western	W. C. Ennis		Wortendyke, N. J.
New York, Providence & Boston	J. H. Anderson	J. H. Anderson	Providence, R. I.
Northern Central	§§R. H. Soule	G. W. Demarest	Baltimore, Md.
Northern Central	J. M. Coale		Baltimore, Md.
Northern Central	James Strode	J. C. Dyott	Baltimore, Md.
Northern New Hampshire	**Jas. N. Lauder		Elmira, N. Y.
Northern Pacific	**A. P. Farrar	A. P. Farrar	Concord, N. H.
Dakota Division	A. Rupert		Brainerd, Minn.
Pacific & P. Oreille Div	C. Z. Sanders	Tho. G. Davis	Fargo, Dak.
Northeastern		W. H. Day	New Tacoma, W.T.
North Pacific Coast	James Walch		Florence, S. C.
Northern & Northwestern	P. Clark		Saucelito, Cal.
			Toronto, Can.

O

Ogdensburg & Lake Champlain	Abraham Klohs	A. Klohs	Malone, N. Y.
Ohio Central	J. B. Morgan		Bucyrus, O.
Ohio & Mississippi	Arthur Donaldson		Vincennes, Ind.
Ohio & Mississippi		J. P. Coulter	Aurora, Ind.
Cincinnati Division	John Thumser		Seymour, Ind.
Springfield Division	J. W. Stokes		Pana, Ill.
Old Colony	J. K. Taylor	A. Gleason	Boston, Mass.
Northern Division	Geo. W. Reynolds	Sam. Stevens	Taunton, Mass.
Olean, Bradford & Warren	Chas. Turner	Chas. Turner	Olean, N. Y
Oregon & California	§§J. Brandt		Portland, Oregon.
Oregonian	Jas. Walch		Portland, Oregon.
Oregon Railway & Navigation Co.	J. F. Curtis	Chas. Phipps	The Dalles, Oregon

P

Paducah & Elizabethtown	W. D. Robb	W. D. Robb	Elizabethtown, Ky.
Painesville & Youngstown	J. H. Jones		Painesville, O.
Panama	Thos. S. O'Brien		Aspinwall, U. S. C.
Parker & Karns City	Philip Davies	Wm. Wolford	Parker City, Pa.
Pensacola & Selma	R. H. Kelly		Selma, Ala.
Pennsylvania	§T. N. Ely		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten	W. Philadelphia, Pa
Pennsylvania	E. L. Caum	Samuel W. Myers	Harrisburg, Pa.
Pennsylvania	G. W. Stratton	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver	J. G. Stewart	Pittsburg, Pa.
New Jersey Division	L. A. Bosdevex	E. F. Bosdevex	Meadowshops, N. J.
New Jersey Division		David H. Baker	Jersey City, N. J.
New Jersey Division	§§H. S. Hayward		Jersey City, N. J.
New Jersey Division	Tho. Kerr	P. S. Bogart	So. Amboy, N. J.
New Jersey Division	R. McDowell		Lambertville, N. J.
New Jersey Division	W. McAllister		Camden, N. J.
West Penn. Division	C. B. Street	M. H. Fails	Blairsville, Pa.
Peoria, Decatur & Evansville	P. Reilly	J. S. Tufts	Mattoon, Ill.
Petersburg	R. B. Andrew	J. W. Fleming	Petersburg, Va.
Philadelphia, Wilmington & Balt	S. A. Hodgman	Wm. Lundgren	Wilmington, Del.
Philadelphia & Atlantic City	J. W. Wright	E. Lippincott	Camden, N. J.
	§§Howard Fry		Williamsport, Pa.
Philadelphia & Erie	W. F. Beardsley		Sunbury, Pa.
	W. L. Forster		Renovo, Pa.
	W. T. Smith		Erie, Pa.
Philadelphia & Baltimore Central	S. D. Danfield	S. D. Danfield	Chester, Pa.
Philadelphia & Reading	*L. B. Paxson	John H. Rankin	Reading, Pa.
Philadelphia & Reading	Jackson Richards		Philadelphia, Pa.
Catawissa Branch	W. H. Ellis	C. D. Ellis	Catawissa, Pa.
Piedmont Air Line	‡R. D. Wade		Richmond, Va.
Rich. & Danville Div.		J. B. Vaughan	Richmond, Va.
North Carolina Div		J. C. Holt	Comp. Shops, N. C.
Pittsburg, Cincinnati & St. Louis	§§G. W. Rhodes		Columbus, O.
Little Miami Division	J. H. Setchel	John McVay	Cincinnati, O
Little Miami Division		M. P. Ford	Columbus, O.
Col., Cin. & Ind. Division	Robert Curtis	Tho. Chamberlin	Columbus, O
Col., Cin. & Ind. Div	Geo. H. Prescott	Chas. H. Starr	Logansport, Ind.
Col. Cin. & Ind. Division	C. M. St. Clair		Indianapolis, Ind.
Cin. & Musk. Val. Division	Leroy Kells	Daniel Jewell	Lancaster, O.
Pitts. Cin. & St. Louis Div'n	Ross Kells		Dennison, O.
Pitts. Cin. & St. Louis Div'n		A. K. Mansfield	Steubenville, O.
Pittsburg, Fort Wayne & Chicago	Geo. J. Parkin	John Marquis	Allegheny, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Roon	Israel Lee	Fort Wayne, Ind
Pittsburg, Fort Wayne & Chicago	Geo. W. Lowe	J. J. Kirkland	Crestline, O.
Pittsburg, Titusville & Buffalo	H. J. Bookhammer	John Monks	Oil City, Pa.
Pittsburg, Virginia & Charleston	Wm. Lininger		Pittsburg, Pa.
Pittsburg & Western	D. C. Courtney		Zelienople, Pa.
Pittsburg & Lake Erie	S. W. Haines		Pittsburg, Pa.
Portland & Ogdensburg	Geo. H. Poor	W. G. Brewer	Portland, Me.
Portland & Rochester	E. H. C. Tompson	David Dow	Portland, Me.
Port Dover & Lake Huron	H. M. Aldrich		Woodstock, Ont.
Port Royal & Augusta	Geo. Riley	J. H. Milton	Port Royal, S. C.
Poughkeepsie, Hartford & Boston	John L. Driscoll		Poughkeepsie, N.Y.
Prince Edward Island	A. Stronach	D. M. Fraser	Charlottet'n, P. E.I
Providence & Springfield	G. T. Richardson		Fascoag, R. I.
Providence & Worcester	A. Griggs	A. Griggs	Providence, R. I.
Providence, Warren & Bristol	Rufus Smith	Rufus Smith	Bristol, R. I.

Q

Quebec, Mont., Ottawa & Occidental	†A. Davis		Montreal, Can
Quincy, Missouri & Pacific			Kirksville, Mo.

R

Raleigh & Augusta Air-Line	**B. R. Harding		Raleigh, N. C.
Raleigh & Gaston	**B. R. Harding		Raleigh, N. C.
Rhinebeck & Connecticut	John Dykeman	John H. Decker	Rondout, N. Y.
Rich. Fredericksburg & Potomac	H. Khun	W. H. Trainham	Richmond, Va.
Richmond & Allegheny	Geo. D. Harris		Richmond, Va.
Richmond & Danville	See Piedmont Air-Line.		
Richmond & Petersburg	John O'Brien	H. L. Carter	Richmond, Va.
Rich., York River & Chesapeake	A. B. Armstrong	A. B. Armstrong	Richmond, Va.
Rio Grande	G. W. Rendall	M. Markwood	Brownsville, Texa.
Rochester & Pittsburg	J. P. Hovey		Rochester, N. Y.
Rock Island & Peoria	Joseph Elder		Peoria, Ill.
Rome, Watertown & Ogdensburg	Geo. H. Haselton	Geo. H. Haselton	Oswego, N. Y.
Rome, Georgia	O. W. Harbin	O. W. Harbin	Rome, Ga.

S

Saginaw Valley & St. Louis			St. Louis, Mich.
San Francisco & Northern Pacific	Ed. Reynolds	John Martin	Donahue, Cal.
Savannah, Florida & Western	§Jas. D. Hollister	P. N. Raynal	Savannah, Ga.
Savannah & Memphis	R. A. Bridges		Opelika, Ala.
Scioto Valley	C. H. Cory	C. H. Cory	Portsmouth, O.
Seaboard & Roanoke	§§M. M. Pendleton		Portsmouth, Va.
Selma, Marion & Memphis	J. M. Levis		Marion, Ala.
Shenango & Allegheny	Edw. Richardson		Greenville, Pa.
Sherman	C. M. Allen		Litchfield, Ct.
Sioux City & Pacific	C. H. Foster	C. H. Foster	Missouri Valley, Ia
Sioux City & St. Paul	F. C. Butterfield	F. C. Butterfield	Shakopee, Minn.
Southern Pacific			
Northern Division	J. T. Wilson	F. N. Bellisle	San Francisco, Cal
Los Angeles & Yuma Div	Jas. Velsir	J. S. Young	Los Angeles, Cal.
Tulare Division	S. Johnson		Tulare, Cal.
South Carolina	§P. J. Cochrane	Geo. H. Gramling	Charleston, S. C
Southern Central	Chas. G. Brown	H. Mooney	Auburn, N. Y.
Southeastern (Canada)	A. G. Eastman		Richford, Vt.
Southwestern of Georgia	D. M. Gugel	James A. Knight	Macon, Ga.
South Pacific Coast	E. L. Reese	E. L. Reese	Newark, Ca

Railroad.	*Master Mechanic.*	*Master Car-Builder.*	*Residence.*
Spartanburg, Union & Columbia	Wm. Platt	W. B. Brown	Spartanburg, S. C.
State Line & Sullivan	J. O. Blight		Towanda, Pa.
Stockton & Copperopolis	M. S. Webb	M. S. Webb	Stockton, Cal.
St. Croix & Penobscot	G. H. Corsen	H. C. Tincker	Milltown, Me.
St. Johns	Jas. M. Owens		St. Augustine, Fla.
St. Johnsbury & Lake Champlain	Geo. E. Howe		St. Johnsbury, Vt.
S. Joseph & Des Moines	F. A. Chase		St. Joseph, Mo.
St. Joseph & Western	E. Sleppy	E. Sleppy	So. St. Joseph, Mo.
St. Lawrence & Ottawa	Calvin Dame	Calvin Dame	Prescott, Canada.
St. Louis, Iron Mount. & So	**O. A. Haynes	Oscar Doolittle	St. Louis, Mo.
Arkansas Division	L. Finlay	L. Finlay	Little Rock, Ark.
Missouri Division	W. H. Harris	H. M. Aldrich	De Soto, Mo.
St. Louis, Alton & Terre Haute	**Berlah Warren		St. Louis, Mo.
St. Louis, Salem & Little Rock	Thomas Everson	A. W. Grosvernor	Steelville, Mo.
St. Louis & San Francisco	M. Kearney	M. Kearney	N. Springfield, Mo
St. Louis, Keokuk & Northwest'n	Wm. Foley		Keokuk, Iowa.
St. Louis Bridge Co. & Tunnel R.R.	H. M. Smith		St. Louis, Mo.
St. Paul & Duluth	W. McFarland	John Hill	St. Paul, Minn.
St. Paul, Minneapolis & Manitoba	A. A. Ackerly		St. Paul, Minn.
St. Paul & Sioux City	Matt Ellis		Shakopee, Minn.
Sussex & Blairstown	E. H. Osborn	R. L. Sutton	Newton, N. J.
Syracuse, Binghamton & N. Y.	James Buchanan	James Buchanan	Syracuse, N. Y.
Syracuse, Chenango & New York	Geo. W. West	Wm. J. McMichael	Syracuse, N. Y.

T

Tennessee & Pacific	William McKeand	William McKeand	Nashville, Tenn.
T. H. & Indianapolis Indianapolis Div. Line. Vandalia Div.	§§C. R. Peddle	E. D. Carter	Terre Haute, Ind.
	Clinton Idler		Indianapolis, Ind
	Chas. Butler		Effingham, Ill.
Logansport Division	A. W. Quackenbush		Logansport, Ind.
Texas & New Orleans	D. C. Smith	J. M. Mather	Houston, Texas.
Texas & Pacific	H. J. Small	H. H. Sessions	Marshall, Texas.
Brazos Division	J. F. Sechler		Dallas, Tex.
Tioga	Pere Bonny	D. H. Stratton	Blossburg, Pa.
Toledo, Delphos & Burlington	F. M. Mast		Delphos, O.
Toronto, Grey & Bruce	†David Preston		Toronto, Can.
Toronto & Nipissing	J. Haggas		Toronto, Can.
Troy & Boston	Z. B. Davis	R. V. Coon	Troy, N. Y.

U

Ulster & Delaware	J. B. Dykeman	Jno. H. Decker	Rondout, N. Y.
Union Pacific	‡‡I. H. Congdon	‡‡Geo. E. Stevens	Omaha, Neb.

Railroad.	*Master Mechanic.*	*Master Car Builder.*	*Residence.*
Eastern Division		A. M. Collett	Omaha, Neb.
Eastern Division		H. P. Makely	Grand Island, Neb.
Mountain & Laramie Div	T. A. Davis	John E. Davis	Cheyenne, Wy. T.
Western Division		R. V. Brinkley	Evanston, Wy. T.
Colorado Division	James S. Scott	E. G. Thomas	Golden, Col.
Denver, S. Park & Pacific Div	J. H. Kirk		Denver, Col.
Kansas Division	**John MacKenzie	J. B. Roberts	Kansas City, Mo.
Kansas Division	John B. Daily		Ellis, Kan.
Kaw Valley Division	Jas. McKenzie		Armstrong, Kan.
Utah Central	W. B. Armstrong	Sam. S. Tucker	Salt Lake City.
Utah Western	Robert Anderson		Salt Lake City, U.
Utica & Black River	John Bailey	David James	Utica, N. Y.
Utica, Ithaca & Elmira	Geo. W. Cleveland	F. W. Magargil	Breesport, N. Y.

V

Valley	B. C. Bosworth	Chas. Blanchard	Cleveland, O.
Vicksburg & Meridian	Jas. B. Browne		Vicksburg, Miss.
Vicksburg, Shreveport & Pacific	W. Bell Smith	W. Bell Smith	Monroe, La.
Virginia & Truckee	I. N. Fordice		Carson, Nev.
Virginia Midland	J. E. Waddey	J. T. Nallo	Alexandria, Va.

W

Wabash, St. Louis & Pacific	Chauncy R. Morris		Fort Wayne, Ind
Wabash, St. Louis & Pacific	Jacob Johann	B. B. Rose	Springfield, Ill.
Wabash, St. Louis & Pacific	W. O. Hewitt	R. M. Hemphill	Peoria, Ill.
Wabash, St. Louis & Pacific		U. H. Kohler	Toledo, Ohio.
Wabash, St. Louis & Pacific		J. S. Hazen	Stanbery, Mo.
Wabash, St. Louis & Pacific	W. H. Selby	C. S. Buck	Moberly, Mo.
Wallkill Valley	John Dykeman	Jno. H. Decker	Rondout, N. Y.
Washington & Ohio	Edward Dunn	John Harrison	Alexandria, Va.
Welland	James Taylor	Wm. H. Pay	St. Catharine, C.W.
Westchester & Philadelphia	§S. D. Danfield	S. D. Danfield	Chester, Pa.
Western & Atlantic	John H. Flynn	W. G. Grambling	Atlanta, Ga.
Western Maryland	§David Holtz	J. H. Nussear	Union Bridge, Md.
Western North Carolina	Geo. W. Gates		Salisbury, N. C.
Western, of Alabama	Robert King	F. M. Wade	Montgomery, Ala.
Western R. R. N. C.	Isaac W. Clark	Isaac W. Clark	Fayetteville, N. C.
Western Union	John Taylor	E. A. Eddy	Racine, Wis.
West Feliciana	J. A. Tilton	J. A. Tilton	Bayou Sara, La.
West Jersey	W. McAllister	C. C. Williams	Camden, N. J.
White Water	§L. W. Wingert		Harrison, O.
Wilmington, Columbia & Augusta	John Bisset	W. H. Day	Florence, S. C.
Wilmington & Welden	John Bisset	C. E. Clowe	Wilmington, N. C.
Wisconsin Central	§§J. B. Henney	J. B. Henney	Stevens' P't, Wis.
Wisconsin Valley	‡‡ B. Snyder		Tomah, Wis.
Worcester & Nashua	John G. Brady	John G. Brady	Worcester, Mass.

Directory of Railway Superintendents and Purchasing Agents

THROUGHOUT THE UNITED STATES AND CANADA.

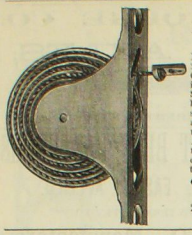
REFERENCES.—* General Manager. † General Superintendent. ‡ Assistant General Superintendent. § Assistant Superintendent. ** Superintendent of Transportation. §§ Assistant General Manager.

Railroad.	Superintendent.	Purchasing Agent.	Residence.
A			
Adirondack	C. E. Burkee		Saratoga, N. Y.
Alabama Great Southern	*John Scott	R. W. Healey	Chattanooga, Tenn.
Alabama Great Southern	Chas. B. Wallace		Chattanooga, Tenn.
Albany & Susquehanna	*C. F. Young		Honesdale, Pa.
Alleghany Valley	David McCargo	David McCargo	Pittsburg, Pa.
Anderson, Lebanon & St. Louis	Jas. A. Larnerd		Anderson, Ind.
Arkansas Midland	*A. H. Johnson		Helena, Ark.
Asheville & Spartanburg	James Anderson		Spartanburg, S. C.
Ashtabula & Pittsburg	D. B. McCoy		Ashtabula, O.
Atchison, Topeka & Santa Fe	*C. C. Wheeler	F. M. Smith	Topeka, Kan.
Atchison, Topeka & Santa Fe	J. D. Layng		Topeka, Kan.
Ohio & Chicago Division	B. Dunham		Newark, O.
Southern Division	A. A. Robinson		Las Vegas, N. M.
Eastern Division	D. J. Chase		Topeka, Kan.
Atlanta & Charlotte Air Line	*G. J. Foreacre	G. J. Foreacre	Atlanta, Ga.
Atlanta & West Point	*Cecil Gabbett		Atlanta, Ga.
Atlantic & North Carolina	A. B. Andrews		Newbern, N. C.
Atlantic & Pacific	F. W. Smith		Albuquerque, N.M.
Atlantic & Pacific		D. B. Sibley	Chicago, Ill.
Atlantic, Tennessee & Ohio	J. J. Gormley		Charlotte, N. C.
B			
Baltimore & Ohio	**W. M. Clements	N. S. Hill.	Baltimore, Md.
Ohio & Chicago Division	*B. Dunham		Newark, O.
Ohio & Chicago Division	W. C. Quincy		Newark, O.
Pittsburg Division	Thos. M. King		Pittsburg, O.
Bangor & Piscataquis	Arthur Brown		Bangor, Me.
Bath & Hammondsport	M. H. Hall		Hamm'dsp't, N. Y.
Bedford, Sp'gville, Owensb'g & Bd.	Jas. W. Kennedy	Jas. W. Kennedy	Bedford, Ind.
Bellefonte & Snow Shoe	Daniel Rhoads		Bellefonte, Pa.
Bell's Gap	Robert G. Ford		Bellwood, Pa.
Belt R. R. & Stock Yard	*M. A. Downing	M. A. Downing	Indianapolis, Ind
Bennington & Rutland	F. C. White	F. C. White	Rutland, Vt.
Boston, Revere Beach & Lynn	E. H. Joorf		Boston, Mass.
Boston & Albany	*Wm. Bliss		Boston, Mass.
Boston & Albany	C. O. Russell		Springfield, Mass.
Boston & New York Air Line	Jos. H. Franklin		New Haven, Conn.
Boston & Providence	A. A. Folsom	A. A. Folsom	Boston, Mass.
Boston Concord & Montreal	*J. A. Dodge		Plymouth, N. H.
Boston, Concord & Montreal	§W. A. Stowell	J. Thomas Vose	Boston, Mass.
Boston, Hoosac Tunnel & Western	J. L. Wellington		Mechanicville, N.Y.
Boston & Maine	J. T. Furber	J. T. Furber	Boston, Mass.
Boston & Lowell	C. E. A. Bartlett	F. H. Nourse	Boston, Mass.
Boston, Barre & Gardner	H. M. Witter	H. M. Witter	Worcester, Mass.
Bradford, Bordell & Kinzua	B. C. Williams	B. C. Williams	Bradford, Pa.
Brooklyn, Flatbush & Coney Isl'd.	Robert White		Brooklyn, N. Y.
Brunswick & Albany	R. D. Meader		Brunswick, Ga.
Burlington & Mo. River (in Neb.)	*A. E. Touzalin	G. Hargreaves	Omaha, Neb.
Burlington & Mo. River (in Neb.)	Geo. W. Holdrege		Omaha, Neb.
First Division	J. O. Phillipi		Lincoln, Neb.
Burlington, Cedar Rapids & Nor'n	C. J. Ives	Theo. Stickney	Cedar Rapids, Ia.
Burlington & Northwestern	John F. Gerry	John F. Gerry	Burlington, Ia.
Burlington & Southwestern	J. W. Smith	J. W. Smith	Burlington, Ia.
Buffalo & Southwestern	*John F. Moulton		Buffalo, N. Y.
Buffalo, New York & Philadelphia	Geo. S. Gatchell	J. H. Pools	Buffalo, N. Y.
C			
Cairo & St. Louis	Chas. Hamilton	Chas. Hamilton	St. Louis, Mo.
Cairo & Vincennes	Roswell Miller	G. H. Lyman	Cairo, Ill.
California Northern	§J. A. Fillmore		Sacramento, Cal.
Camden & Atlantic	F. A. Lister	F. A. Lister	Camden, N. J.
Canadian Pacific	*Archer Baker		Brockville, Can.
Canada Southern	*Wm. P. Taylor		Buffalo, N. Y.
Canada Southern		A. F. Howland	St. Thomas, Ont.
U. S. Division	E. P. Murray		Toledo, O.
Canada Division	W. E. Carroll		St. Thomas, Ont.
Cape Fear & Yadkin Valley	L. C. Jones		Fayetteville, N. C.
Canadian Pacific	A. B. Stickney	Geo. P. Nelson	Winnepeg, Man.
Carolina Central	V. Q. Johnson	C. H. Roberts	Wilmington, N. C.
Catasauqua & Fogelsville	C. W. Chapman	C. W. Chapman	Catasauqua, Pa.
Cayuga Southern	W. Stevenson		Sayre, Pa.
Cayuga & Susquehanna	W. R. Humphreys		Ithaca, N. Y.
Central Pacific	*A. N. Towne		San Francisco, Cal.
Central Pacific	J. A. Fillmore	J. R. Watson	San Francisco, Cal.
Central Pacific			Sacramento, Cal.
Western & Visalia Divisions	A. D. Wilder		Oakland, Cal.
Truckee Division	Frank Free		Wadsworth, Nev.
Humboldt Division	G. W. Coddington		Carlin, Nev.
Salt Lake Division	A. G. Fell		Ogden, Utah
Sacramento & Oregon Div	R. H. Pratt		Sacramento, Cal.
Central Vermont	J. W. Hobart		St. Albans, Vt.
Central Vermont	§J. M. Foss		St. Albans, Vt.
Western Division	John Schriver		Ogdensburg, N. Y.
Northern Division	J. B. Futooys		St. Johns, P. Q.
Rutland Division	J. Burdett		Rutland, Vt.
New London Northern	G. W. Bentley	G. W. Bentley	New London, Conn.
Central of Georgia	Wm. Rogers	Henry Yonge	Savannah, Ga.
Atlanta Division	W. F. Shellman		Macon, Ga.
Central Iowa	D. N. Pickering	D. N. Pickering	Marshalltown, Ia.
Central of New Jersey	James Moore	B. W. Burnet	Elizabeth, N. J.
Central Division	†W. W. Stearns		Elizabeth, N. J.
Lehigh & Susq. Division	W. S. Tolhemus		Mauch Chunk, Pa
Charleston & Savannah	C. S. Gadsden		Charleston, S. C.
Charlotte, Columbia & Augusta	G. R. Talcott	G. R. Talcott	Columbia, S. C.
Chatarol	C. H. Hickwell	Geo. S. Richardson	Ashland, Ky.
Chesapeake & Ohio	*C. W. Smith		Richmond, Va.
Chesapeake & Ohio	W. M. S. Dunn	A. S. Emmons	Richmond, Va.
Cheraw & Darlington	J. F. Divine		Society Hill, S.
Cherokee	John Postell		Atlanta, Ga.
Cheshire	*R. Stewart	H. H. Stone	Keene, N. H.
Chester & Lenoir	James Mason		Chester, S. C.
Chicago & Northwestern	*Marvin Huchitt	R. W. Hamer	Chicago, Ill.
Chicago & Northwestern	J. D. Layng		Chicago, Ill.
Chicago & Northwestern			Chicago, Ill.
Wisconsin & Mill. Division	E. J. Cuyler		Chicago, Ill.
Peninsula Division	W. B. Lindsay		Escanaba, Mich
Madison Division	C. A. Swineford		Baraboo, Wis.
Galena Division	Chas. Murray		Chicago, Ill.
Des Moines & Iowa Division	J. M. Whitman		Clinton, Iowa.
Winona & St. Peter Division	S. Sanborn		Winona, Minn.
Dakota Central Division	T. J. Nichols		Huron, Dak
Galena & Wisconsin Br.	J. B. Trull		Galena, Ill.
Chicago & Alton	*J. C. McMullen	A. V. Hartwell	Chicago, Ill.
Chicago & Alton	C. H. Chapell		Chicago, Ill.
Chicago Division	A. M. Richards		Chicago, Ill.
Kansas City St. Louis Div.	O. Vaughan		Slater, Mo.
Chicago & Block Coal	*A. F. Beach		Veedersburg, Ind.
Chicago, Burlington & Quincy	*Thos. J. Potter	Wm. Irving	Chicago, Ill.
Illinois Divisions	†John D. Besier		Galesburg, Ill.
Middle, Galesb'g & Q'y Div	F. C. Rice		Galesburg, Ill.
St. Louis & R. Isl'd Division	W. R. Crumpton		St. Louis Mo.
Iowa Division	K. H. Wade		Burlington, Iowa.
Chicago & Eastern Illinois	O. S. Lyford	O. S. Lyford	Chicago, Ill.

Railroad.	Superintendent.	Purchasing Agent.	Residence.
Chicago & Iowa	W. H. Holcomb, Rec.		Rochelle, Ill.
Chicago, St. Louis & New Orleans	*J. C. Clarke	J. C. Febiger, Jr.	New Orleans, La.
South Division	W. P. McKinley		McComb City, Miss
North Division	J. G. Mann		Jackson, Tenn.
Chicago, Rock Island & Pacific	A. Kimball		Chicago, Ill.
Chicago, Rock Island & Pacific	*R. R. Cable	F. A. Marsh	Chicago, Ill.
Southwestern Division	G. F. Walker		Trenton, Mo.
Iowa Division	H. F. Royce		Des Moines, Iowa.
Illinois Division	R. H. Chamberlin		Chicago, Ill.
Keokuk & Des Moines Div.	John Given		Keokuk, Ia.
Chicago & West Michigan	W. M. Lawler		St. Joseph, Mich.
Chicago, Milwaukee & St. Paul	*S. S. Merrill		Milwaukee, Wis.
Chicago, Milwaukee & St. Paul	W. C. Van Horne	J. T. Crocker	Milwaukee, Wis.
Dubuque Division	J. H. Jenkins		Dubuque, Iowa.
Wisconsin Valley Div	H. C. Atkins		Milwaukee, Wis.
Northern Division	L. B. Rock		Milwaukee, Wis.
Minn. & Dakota Division	C. H. Prior		Minneapolis, Minn.
Western Union Division	D. A. Olin		Racine, Wis.
Sioux City & Dak. Div	G. W. Sanborn		Sioux City, Ia.
Southern Minnesota Div	J. M. Egan		La Crosse, Wis
Chicago, Pekin & Southwestern	J. Murray	A. H. Cook	Chicago, Ill.
Chicago, St. Paul, Minn. & Omaha	Chas. F. Hatch	W. H. S. Wright	St. Paul, Minn.
Nebraska Division	G. V. Morford		Omaha, Neb.
Cincinnati Northern	*C. W. Bradley		Cincinnati, O.
Cincinnati & Eastern	George H. Wilber		Batavia, O.
Cincinnati, Wabash & Michigan	*Norman Beckley	Norman Beckley	Elkhart, Ind.
Cincinnati, Wabash & Michigan	O. W. Lamport		Wabash, Ind.
Cincinnati, Hamilton & Dayton	J. H. Barrett	C. M. Woodward	Cincinnati, O.
Cin., Hamilton & Indianapolis	Lewis Williams		Cincinnati, O.
Cincinnati Southern	Sam'l Woodward	Julius Uhlein	Cincinnati, O
Cin., Indianapolis, St. Louis & Chi	J. W. Sherwood		Chicago, Ill.
Cin., Indianapolis, St. Louis & Chi.		George Tozzer	Indianapolis, Ind
Cleve., Col., Cin. & Indianapolis	*E. B. Thomas	J. L. Yale	Cincinnati, O.
Indianapolis Division	John O. Ewan		Cleveland, O.
Col. and Cincinnati Divs	Robert Blee		Union, Ind.
Cleveland & Marietta	S. C. Baldwin	R. B. Hoover	Cleveland, O.
Cleveland & Pittsburg	John Thomas		Marietta, Ohio.
Cleveland & Pittsburg	*J. D. Layng	Wm. Mullins	Cleveland, O.
Cleveland, Mt. Vernon & Columb's	G. A. Jones		Pittsburg, Pa.
Cleve., Tuscarawas Val. & Wheel	*Oscar Townsend		Mt. Vernon, O.
Cobourg, Petersboro & Marmora	James R. Barber	J. R. Barber	Cleveland, O.
Columbia & Greenville	T. M. R. Talcott		Cobourg, Ont.
Columbia & Greenville	J. W. Fry		Richmond, Va.
Columbus & Hocking Valley	Geo. R. Carr	Geo. R. Carr	Columbus, O.
Columbus & Toledo	Geo. R. Carr	Geo. R. Carr	Columbus, O.
Columbus & Rome	T. J. Nuckolls		Columbus, Ga.
Concord & Claremont	George E. Todd		Concord, N. H.
Concord	H. E. Chamberlin	H. E. Chamberlin	Concord, N. H.
Concord & Portsmouth	H. E. Chamberlin		Concord, N. H.
Connecticut River	John Mulligan	John Mulligan	Springfield, Mass.
Connecticut Valley	Samuel Babcock		Hartford, Conn.
Connecticut Western	J. F. Jones		Hartford, Conn.
Connecticut & Passumpsic Rivers	H. E. Folsom		Lyndonville, Vt.
Corning, Cowanesque & Antrim	A. H. Gorton	Andrew Beers	Corning, N. Y.
Connotton Valley	*C. G. Patterson	C. G. Patterson	Canton, O.
Credit Valley	H. G. Taylor		Toronto, Ont.
Cumberland Valley	J. F. Boyd	O. N. Lull	Chambersburg, Pa.
Cumberland & Pennsylvania	P. L. Burwell	P. L. Burwell	Cumberland, Md.
Cumberland & Maurice River	L. H. Dowdney		Port Norris, N. J.
D			
Danbury & Norwalk	L. W. Sandiforth		South Norwalk, C.
Danville & Southwestern	James A. Eads		Paris, Ill.
Danville, Olney & Ohio River	J. M. Graham		Kansas, Ill.
Dayton & Michigan	E. E. Dwight		Toledo, O.
Dayton & Union	C. C. Gale		Indianapolis, Ind.
Delaware & Chesapeake	O. S. Sanford		Easton, Md.
Delaware & Hudson Canal Co.	R. Manville	R. Manville	Carbondale, Pa.
Delaware & Hudson Canal Co.	*C. F. Young		Honesdale, Pa.
Albany & Susq. Division	C. D. Hammond		Albany, N. Y.
Rensselaer & Saratoga Div.	Theo. Voorhees		Troy, N. Y.
Delaware, Lackawanna & Western		G. W. B. Cushing	New York City.
Delaware, Lackawanna & Western	W. F. Hallstead		Scranton, Pa.
Bloomsburg Division	G. Bogart		Scranton, Pa.
Morris & Essex Division	Andrew Reasoner		Hoboken, N. J.
Oswego & Syracuse Division	W. B. Phelps		Oswego, N. Y.
Utica, Chenango & Sus. Div.	F. J. Griffiths		Scranton, Pa.
Delaware & Western	David Connell		Wilmington, Del.
Denver & Rio Grande	*D. C. Dodge		Denver, Col.
Denver & Rio Grande	George W. Cushing		Denver, Col.
Denver & Rio Grande		A. B. Garner	Colorado Spr's, Col.
First Division	M. C. Kimberly		Pueblo, Col.
Second Division	W. H. Bancroft		Alamosa, Col.
Des Moines, Northwestern	C. N. Gilmore		Des Moines, Iowa.
Des Moines & Ft. Dodge	C. N. Gilmore	C. N. Gilmore	Des Moines, Iowa.
Detroit, Gr. Haven & Milwaukee	W. J. Morgan	John S. Lorimer	Detroit, Mich.
Detroit, Hillsdale & Southwestern	W. F. Parker		Ypsilanti, Mich.
Detroit, Lansing & Northern		Allan Bourn	Detroit, Mich.
Detroit, Lansing & Northern	T. M. Fish		Ionia, Mich.
Detroit, Mackinac & Marquette	James McMillan		Detroit, Mich.
Dorchester & Delaware	Tho. E. Wright		Cambridge, Md.
Dubuque & Dakota	A. C. Goodrich		Waverly, Iowa.
Dunkirk, Allegheny Val. & Pitts	D. Thayer		Dunkirk, N. Y.
Dunkirk, Allegheny Val. & Pitts		R. C. Moore	New York City.
E			
East Broad Top	A. W. Sims		Orbisonia, Pa.
East Alabama	W. W. Barnes		Opelika, Ala.
East Line & Red River	W. B. Ward		Jefferson, Tex.
East St. Louis & Carondelet	J. W. Jones		E. St. Louis, Ill.
East Tenn., Virginia & Georgia	*J. P. O'Brien	J. Y. Johnston	Knoxville, Tenn.
Selma Division	John M. Bridges		Selma, Ala.
N. Carolina Division	W. J. Taylor		Knoxville, Tenn.
Ohio Division	G. J. Kinzel		Knoxville, Tenn.
Alabama Central Division	J. M. Bridges		Selma, Ala.
Macon & Brunswick Div.	J. M. Edwards		Macon, Ga.
Eastern	**D. W. Sanborn	Geo. J. Fisher	Boston, Mass.
Eastern Kentucky	*H. W. Bates	H. W. Bates	Riverton, Ky.
Eastern Shore	W. Thompson		Prince Anne, Md.
Elizabeth City & Norfolk	*Morris K. King		Norfolk, Va.
Erie & Pittsburg	J. M. Kimball		Erie, Pa.
Erie & Pittsburg	*J. D. Layng	Wm. Mullins	Pittsburg, Pa.
Eureka & Palisade	P. Evarts		Palisade, Nev.
European & North American	F. W. Cram		Bangor, Maine.
Evansville & Terre Haute	J. E. Martin	Jno. L. White	Evansville, Ind.
Evansville, Rockport & Eastern	G. C. Weaver		Evansville, Ind.
F			
Fitchburg	John Adams	F. S. Pratt	Boston, Mass.
Vermont & Mass. Div.	‡E. K. Turner		Fitchburg, Mass
Flint & Pere Marquette	Sanford Keeler	G. G. Cook	E Saginaw, Mich.
Eastern Division	W. F. Potter		E. Saginaw, Mich.
Western Division	V. Meredith		E. Saginaw, Mich.
Florida Central	W. M. Davidson	W. M. Davidson	Jacksonville, Fla.
Fonda, Johnst'n & Gloversville	L. Caten		Gloversville, N.Y.
Fon du Lac, Amboy & Peoria	A. Kinyon		Fond du Lac, Wis.
Fort Madison & Northwestern	S. B. Kenrick	S. B. Kenrick	Fort Madison, Ia
Fort Wayne & Jackson	M. D. Woodford	M. D. Woodford	Jackson, Mich.
Fort Wayne, Muncie & Cincinnati	W. W. Worthington	& P. Ag't.	Fort Wayne, Ind.
Frankfort & Kokomo	A. W. Hazelrigg	E. H. Andress	Lafayette, Ind.
Fredericton	F. B. Edgecombe		Fredericton, N. B.
Freehold & New York	J. E. Ralph	J. E. Ralph	Freehold, N. J.
G			
Gal., Harrisburg & San Antonio	James Converse		Houston, Texas.

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Gal., Harrisburg & San Antonio		Chas. Babbidge	Boston, Mass.
Gal., Houston & Henderson	*W. H. Harding	W. H. Harding	Galveston, Texas.
Geneva, Ithaca & Sayre	Wm. Stevenson		Sayre, Pa.
Georgia	*John W. Green		Augusta, Ga.
Grand Haven	Geo. C. Kimball	H. Park	Allegan, Mich.
G. Rapids, Newaygo & L. Shore	‡A. M. Nichols	H. Park	G. Rapids, Mich.
Grand Rapids & Indiana	W. O. Hughart, Pres't	W. R. Shelby	G. Rapids, Mich.
Northern Division	J. M. Matheany		G. Rapids, Mich.
Southern Division	P. S. O'Rourke		Fort Wayne, Ind.
Grand Trunk	*J. Hickson	John Taylor	Montreal, Canada.
Grand Trunk	W. J. Spicer		Montreal, Canada.
Chicago Division	S. R. Callaway		Chicago, Ill.
Grand Tower & Carbondale	T. M. Williamson	Wm. W. Harris	Grand Tower, Ill.
Great Western (Canada)	Charles Stiff		Hamilton, Ont.
Great Western (Canada)		G. R. Nash	London, Ont.
Green Bay, Winona & St. Paul	*Timothy Case		Green Bay, Wis.
Greenville, Col. & Birmingham	E. P. Buell		Greenville, Miss.
Grneewich & Johnsonville	J. H. Thompson		Greenwich, N. Y.
Gulf, Colorado & Santa Fé	*John Sealey	F. P. Killeen	Galveston, Texas.
Gulf, Western Texas & Pacific	M. D. Monserrate		Cuero, Texas.
H			
Hannibal & St. Joseph	*John B. Carson	T. L. Dunn	Hannibal, Mo.
Eastern Division	W. R. Woodard		Hannibal, Mo.
Hanover Junction & Gettysburg	Henry A. Young	H. A. Young	Hanover, Pa.
Harlem Extension South	*R. C. Root		Bennington, Vt.
Hartford & Connecticut Valley	Samuel Babcock		Hartford, Conn.
Havana, Rantoul & Eastern	H. E. Bullock		Rantoul, Ill.
Housatonic	L. B. Stillson		Bridgeport, Conn.
Houston, East & West Texas			Houston, Texas.
Houston & Texas Central	A. H. Swanson	A. H. Swanson	Houston, Texas.
Southern Division	M. G. Howe		Houston, Texas
Northern Division	G. A. Quinlan		Corsicana, Texas.
Huntingdon & Broad Top	Geo. F. Gage	S. B. Knight	Huntingdon, Pa.
I			
Illinois Central	E. T. Jeffrey	O. Ott	Chicago, Ill.
Chicago Division	T. J. Hudson		Centralia, Ill.
Middle Division	H. L. Frisbie		Pontiac, Ill.
Northern Division	J. C. Jacobs		Amboy, Ill.
Iowa Division	D. W. Parker		Dubuque, Ia.
Springfield Division	Wm. Wilkinson		Springfield, Ill.
Illinois Midland	L. Genis, *Rec.*		Terre Haute, Ind
Illinois & St. Louis	C. H. Sharman		St. Louis, Mo.
Indiana, Bloomington & Western	§§C. E. Henderson	H. C. Norton	Indianapolis, Ind.
Ohio Division	D. W. C. Brown		Sandusky, Ohio.
Indianapolis, Decatur & Spring.	F. L. Peck		Indianapolis, Ind.
Indianapolis & St. Louis	C. C. Gale	H. W. Comstock	Indianapolis, Ind.
Indianapolis, Peru & Chicago	*V. T. Malott		Indianapolis, Ind.
Indianapolis, Peru & Chicago		John Mc Kenna	Peru, Ind.
Indianapolis & Vincennes	J. J. Turner		Indianapolis, Ind
Intercolonial	D. Pottinger	T. V. Cooke	Moncton, N. B.
Halifax & St. John Division	Jas. Coleman		Truro, N. S.
Northern Division	M. Busby		Campbellt'n, N. B.
International & Great Northern	*H. M. Hoxie	H. M. Hoxie	Palestine, Texas.
San Antonio Division	Jos. Hurion		San Antonio, Tex.
Gulf Division	R. B. Pegram		Houston, Texas.
Iowa Eastern	H. H. Kerr		Beulah, Iowa
Iron Mountain & Helena	Z. Hamer		Helena, Ark.
J			
Jacksonville, N. Western & S. E.	E. S. Greenleaf		Jacksonville, Ill.
Jacksonville, Pen. & Mobile	C. H. Allen	J. D. Hollister	Tallahassee, Fla.
Jacksonville & Southeastern	E. S. Greenleaf		Jacksonville, Ill.
Jeff., Madison & Indianapolis	E. W. McKenna		Louisville, Ky.
Jeff., Madison & Indianapolis		Wm. Mullins	Pittsburg, Pa.
Junction & Breakwater	Tho. Groome		Lewes, Del.
K			
Kansas Central	W. A. Martin	W. A. Martin	Leavenworth, Kan
Kan. City, Burlington & Santa Fe	James Houston		Burlington, Kan.
Kansas City, Fort Scott & Gulf	L. W. Towne	H. P. Jacques	Kansas City, Mo.
Kansas City, Lawrence & South	L. W. Towne	H. P. Jacques	Kansas City, Mo.
Kan. City, St. Joseph & C. Bluffs	J. F. Barnard		St. Joseph, Mo.
Kent Co. & Smyrna & Del. Bay	J. F. Bingham		Chestertown, Md.
Kentucky Central	*J. D. Ellison		Covington, Ky.
Kingston & Pembroke	B. W. Folger	Wm. Harty	Kingston, Can.
Knox & Lincoln	C. A. Coombs	C. A. Coombs	Bath, Maine.
L			
Lake Erie & Western	*E. H. Waldron	E. H. Andress	Lafayette, Ind.
Sandusky Division	D. S. Hill		Fremont, Ohio.
Bloomington Division	J. B. Clark		LaFayette, Ind.
Lake Ontario Southern	*Jas. E. Briggs		Newark, N. Y.
Lake Shore & Mich. Southern	*John Newell		Cleveland, Ohio.
Lake Shore & Mich. Southern		A. C. Armstrong	Cleveland, Ohio.
Buffalo & Erie Division	C. B. Couch		Cleveland, Ohio.
Toledo Division	Thos. Flesher, Jr		Cleveland, Ohio.
Michigan Division	J. E. Curtis		Toledo, Ohio.
Detroit Division	T. J. Charlesworth		Detroit, Mich.
Western Division	J. H. Parsons		Chicago, Ill.
Lansing Division	W. H. Caniff		Lansing, Mich.
Franklin Division	Geo. H. McIntire		Stoneboro, Pa.
Lebanon Springs	*W. C. Van Alstyne		Albany, N. Y.
Lehigh Valley	Robert H. Sayre		Bethlehem, Pa.
Lehigh Valley		L. Chamberlin	Philadelphia, Pa.
Beaver Meadow Division	A. G. Brodhead, Jr		Mauch Chunk, Pa
Mahanoy Division			Mauch Chunk, Pa.
New Jersey Division			Metuchen, N. J.
Wyoming Division	A. Mitchell		Wilkesbarre, Pa.
Levis & Kennebec	W. C. Hall		Quebec, Can.
Ligonier Valley	Thos. A. Mellon		East Liberty, Pa.
Little Rock & Fort Smith	T. Hartman		Little Rock, Ark.
Little Rock, Miss. River & Texas	J. A. Woodson	J. A. Woodson	Little Rock, Ark.
Los Angeles & Independence	§W. J. L. Moulton		Los Angeles, Cal.
Long Island	Austin Corbin, *Rec*		L'g Isla'd C'y, N.Y
Louisiana Western	C. A. Burton		Houston, Tex.
Louisville & Nashville	*F. de Funiak		Louisville, Ky.
Louisville & Nashville	D. W. C. Rowland	G. C. Breed	Louisville, Ky.
St. L. & S. E. & N. & D. Div.	James Montgomery	J. N. McCoy	Evansville, Ind.
Memphis Line	J. T. Harrahon		Memphis, Tenn.
Nashville & Decatur Div	James Geddes		Nashville, Tenn.
So. & North Ala. Division	E. Marsh		Birmingham, Ala.
Mobile & New Orleans Div			Mobile, Ala.
Louisville, Cincinnati & Lexington	Wm. Mahl	Wm. Mahl	Louisville, Ky.
Louisville, New Albany & Chicago	John McLeod	Wm. M. Lewis	Louisville, Ky.
Louisville, N. Albany & St. Louis	H. L. Shepherd		New Albany, Ind.
M			
Maine Central	Payson Tucker		Portland, Me.
Manchester & Lawrence	H. E. Chamberlin		Concord, N. H.
Manchester & North Weare	H. E. Chamberlin		Concord, N. H.
Manchester & Keene	B. F. George		Keene, N. H.
Manhattan Beach	A. Corbin, *Pres't*		New York, N. Y.
Manhattan Elevated	*Frank K. Hain	James Tobin	New York, N. Y.
Manhattan Elevated	C. L. Green		New York, N. Y.
Marietta & Cincinnati	Jas. H. Stewart	J. H. Stewart	Cincinnati, O.
Marquette, Hought'n & Ontonag'n	*Samuel Schoch	R. M. McCauley	Marquette, Mich.
McKean & Buffalo	S. V. Godden		Smethport, Pa.
Memphis & Little Rock	*Wm. E. Smith	W. E. Smith	Memphis, Tenn.
Memphis & Little Rock	E. K. Sibley		Memphis, Tenn.
Memphis & Charleston	John A. Grant	John A. Grant	Huntsville, Ala.
Memphis, Paducah & Northern	*N. Monsarrat	N. Monserrat	Paducah, Ky.
Mexican National	*G. Clinton Gardner	A. R. Roberts	New York, N. Y.
Michigan Air Line	*M. S. Hadley		Romeo Mich.
Michigan Central	*H. B. Ledyard	Allan Bourn	Detroit, Mich.
Michigan Central	‡E. C. Brown		Jackson, Mich.
Mackinaw & Saginaw Div	W. A. Vaughan		Bay City, Mich.
Main L'e & G. R. & Kal. Div's	C. B. Bush		Jackson, Mich.
Detroit & Bay City Div	W. A. Vaughan		Bay City, Mich.
Western Division	F. C. Nicholas		Chicago, Ill.
Middleburg & Schoharie	P. S. Demforth		Middleburg, N.Y.
Middletown & Crawford	D. Thompson		Thompson, Ridge, N.Y.
Midland Railway of Canada	H. G. Taylor		Port Hope, Ont.
Milwaukee, Lake Shore & West'n	H. G. H. Reed		Milwaukee, Wis.
Mineral Range	*C. E. Holland		Hancock, Mich.
Minneapolis & St. Louis	*C. H. Hudson		Minneapolis, Minn
Minneapolis & St. Louis	E. Ryder		Minneapolis, Minn.
Mississippi & Tennessee	M. Burke	M. Burke	Memphis, Tenn.
Mississippi Valley & Ship Island	A. L. Jaquitt		Vicksburg, Miss.
Missisquoi	W. C. Smith		St. Albans, Vt.
Missouri Pacific	A. A. Talmage	R. B. Lyle	St. Louis, Mo.
Missouri Pacific	‡A. W. Dickinson		St. Louis, Mo.
Eastern Division	O. H. Dorrance		St. Louis, Mo.
Central Branch Division	W. W. Fagan		St. Louis, Mo.
Western Division	Warder Cumming		Sedalia, Mo.
Mobile & Alabama Grand Trunk	F. B. Clark, Prest		Mobile, Ala.
Mobile & Ohio	*A. L. Rives	A. L. Rives	Mobile, Ala.
Northern Division	E. S. Hosford		Jackson, Tenn.
Southern Division	C. Fleming		Mobile, Ala.
Mobile & Girard	W. L. Clark		Columbus, Ga.
Mobile & Montgomery	Geo. Nason		Montgomery, Ala
Mont Alto	G. B. Weistling		Mont Alto, Pa.
Montgomery & Eufaula	W. F. Shellman		Macon, Ga.
Montpelier & Wells River	W. A. Stowell		Montpelier, Vt.
Montrose	J. I. Blakslee	J. I. Blakslee	Mauch Chunk, Pa.
Morgan's Louisiana & Texas	Geo. Pandeley	C. A. Whitney & Co.	New Orleans, La.
Muncy Creek	H. R. Mehrling		Hughesville, Pa.
N			
Nashua, Acton & Boston	H. E. Chamberlin		Concord, N. H
Nashua & Lowell	Chas. E. Paige	Chas. E. Paige	Nashua, N. H.
Nashville, Chattanooga & St. Louis	J. W. Thomas		Nashville, Tenn
Natchez, Jackson & Columbus	J. H. Fitzpatrick		Natchez, Miss.
Naugatuck	Geo. W. Beach	Geo. W. Beach	Waterbury, Conn.
Nevada County	John F. Kidder		Grass Valley, Cal.
Nebraska	Wm. Irving		Omaha, Neb.
Nevada Central	F. W. Dunn	F. W. Dunn	Battle Mountain, Nev.
New Orleans Pacific	H. S. Moore		New Orleans, La.
New Orleans & Selma	L. B. Scofield		Selma, Ala.
Newburg, Dutchess & Connecticut	C. L. Kimball	C. L. Kimball	Dutchess J'n, N.Y.
New Brunswick & Canada	John Stewart		St. Stephen, N. B.
New Brunswick	E. R. Burpee	Alfred Seely	Gibson, N. B.
New Canaan	Wm. St. John		New Canaan, Conn.
New Castle & Oil City	A. Vandivort		New Castle, Pa.
New Haven & Derby	E. S. Quintard		New Haven, Conn.
New Haven & Northampton	C. A. Goodnow	C. N. Yeamans	New Haven, Conn.
New Jersey & New York	J. D. Hasbrouck		Jersey City, N. J.
New Jersey Southern	Rufus Blodgett		119 Lib. st., N. Y.
New York City & Northern	F. S. Gannon		High Bridge, N. Y.
New York, Lake Erie & Western	*Robert Harris		New York, N. Y.
New York, Lake Erie & Western	E. S. Bowen	J. A. Hardenbergh	New York, N. Y.
New York, Lake Erie & Western	‡Benj. Thomas		New York, N. Y.
New York, Lake Erie & Western	**P. P. Wright		Jersey City, N. J.
Eastern Division	E. O. Hill		Port Jervis, N. Y.
Delaware Division	Chas. Neilson		Port Jervis, N. Y.
Susquehanna Division	R. B. Cable		Elmira, N. Y.
Buffalo & Rochester Div	R. G. Taylor		Buffalo, N. Y.
Western Division	J. S. Beggs		Dunkirk, N. Y.
New York & Greenwood Lake	Geo. Hill		Pompton, N. J.
New York, New Haven & Hartford	*E. M. Reed	R. N. Dowd	New Haven, Conn.
N. Y. & N. H. Division	John T. Moody		New York, N. Y.
Hartford Division	C. S. Davidson		Hartford, Conn.
Shore Line Division	W. H. Stevenson		New Haven, Conn.
New York Central & Hudson Riv	John M. Toucey	R. C. Moore	New York, N. Y
Hudson River & Harlem Div	C. M. Bissell		New York, N. Y.
Eastern Division	Zenas C. Priest		Albany, N. Y.
Western Division	Geo. H. Burrows		Buffalo, N. Y.
New York Central Division	Jas. Tillinghast		Albany, N. Y.
New York & New England	*Jas. H. Wilson	W. W. McKim	Boston, Mass.
Eastern Division	O. M. Shepard		Boston, Mass.
Norwich Division	P. St. M. Andrews		Norwich, Conn.
Western Division	J. C. Rawn		Hartford, Conn.
Providence Division	L. W. Palmer		Providence, R. I.
New York & Sea Beach	*C. W. Douglas		110 B'y, New York.
New York & Sea Beach	W. A. Sheldon		Bay Ridge, L. I.
New York, Ontario & Western	Jas. E. Childs		Middletown, N.
Middle Div	N. R. Hankin	Charles Clark	Middletown, N. Y.
Northern Division	C. W. Lanpher		Norwich, N. Y.
Southern Division	A. H. Danforth		Middletown, N. Y.
New York, Penn. & Ohio	P. D. Cooper	J. H. Holway	Cleveland, O.
First & Second Divisions	A. L. Dunbar		Meadville, Pa.
Third and Fourth Divisions	T. A. Phillips		Galion, O.
Mahoning Division	J. M. Ferris		Cleveland, O.
New York, Providence & Boston	J. B. Gardiner		Providence, R. I.
New York, Providence & Boston		Giles F. Ward	Stonington, Conn.
New York, Susquehanna & West	*H. M. Britton		New York, N. Y.
N. Y., Woodhaven & Rockaway	J. M. Lunt		Hunter's Pt., L. I.
Norfolk & Western	*Henry Fink	J. P. Minetree	Petersburg, Va.
Northern Pacific	*Herman Haupt	E. T. Williams	St. Paul, Minn.
Northern Pacific	H. A. Towne		Brainerd, Minn.
Pacific & P. Oreille Div	J. W. Sprague	J. W. Sprague	New Tacoma, W. T.
Missouri Division	D. R. Taylor		Mandon, Dak.
Dakota Division	C. T. Hobart		Fargo, Dak.
North Carolina	See Piedmont Air-Line.		
Northern Central	*Frank Thomson		Philadelphia, Pa.
Northern Central		A. W. Sumner	Baltimore, Md.
Baltimore Division	Geo. C. Wilkins		Baltimore, Md
Elmira & Canandaigua Div	R. Neilson		Elmira, N. Y.
Susquehanna Division	R. Neilson		Williamsport, Pa.
Northern (New Hampshire)	George F. Todd		Concord, N. H.
Northeastern (Georgia)	H. R. Bernard		Athens, Ga.
Northeastern (South Carolina)	J. F. Devine		Charleston, S. C.
North Pacific Coast	W. C. Fillmore	W. F. Russell	San Francisco, Cal.
Northwestern Ohio	J. S. Morris		Toledo, O.
Northern & Northwestern	Jas. Webster		Toronto, Can.
O			
Ogdensburg & Lake Champlain	*A. A. Gaddis		Malone, N. Y.
Ogdensburg & Lake Champlain	A. Klohs		Malone, N. Y
Ohio Central	*G. G. Hadley	F. W. Stewart	Columbus, O.
Ohio Central	F. W. Stewart		Toledo, O.
Ohio & Mississippi	W. W. Peabody	G. E. Atwood	Cincinnati, O.
Eastern Division	C. B. Cole		Seymour, Ind.
Western Division	C. M. Stanton		St. Louis, Mo.
Louisville Division	C. Cole		Louisville, Ky.
Ohio Southern	*C. E. Henderson		Indianapolis, Ind.
Ohio & West Virginia	Geo. R. Carr		Columbus, Ohio.
Old Colony	J. R. Kendrick	R. W. Husted	Boston, Mass.
Northern Division	§S. A. Webber		Fitchburg, Mass
Cape Cod Division	§C. H. Nye		Hyannis, Mass.
Main Line Division	§J. H. French		Boston, Mass.
Olean, Bradford & Warren	J. W. Watson		Olean, N. Y.
Olean Bradford & Warren		J. H. Poole	Buffalo, N. Y.
Omaha & Republican Valley	P. J. Nichols		Omaha, Neb.
Omaha & Northern Nebraska	J. E. House		Omaha, Neb.
Oregon & California	J. Brandt, Jr	J. Brandt, Jr	Portland, Oregon.
Oregon Railway & Navigation Co.	G. J. Ainsworth	J. M. Drake	Portland, Oregon.
Oregonian	J. M. Fillmore		Portland, Oregon
Owensboro & Nashville	W. L. Gude		Owensboro, Ky.
P			
Paducah & Elizabethtown	Robert Meek		Elizabethtown Ky

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Painesville & Youngstown	*Geo. M. Patten		Youngstown, O.
Parker & Karns City	W. C. Moberly		Parker City, Pa.
Peach Bottom	S. M. Manifold		York, Pa.
Paw Paw & Toledo & South Haven	John Ihing		Lawton, Mich.
Pennsylvania	*Frank Thomson	Enoch Lewis	Philadelphia, Pa.
Pennsylvania	Charles E. Pugh		Altoona, Pa.
Pennsylvania	**John Reilly		Altoona, Pa.
Frederick Division	J. B. Hutchinson		York, Pa.
New York Division	James McCrea		Jersey City, N. J.
Amboy Division	I. S. Buckelew		Camden, N. J.
Belvidere Division	J. A. Anderson		Lambertville, N. J.
New Jersey Division	F. Wolcott Jackson		Jersey City, N. J.
Philadelphia Division	S. M Provost		Philadelphia, Pa.
Middle Division	H. H. Carter		Harrisburg, Pa
Pittsburg Division	Robert Pitcairn		Pittsburg, Pa.
Tyrone Division	S. S. Blair		Tyrone, Pa.
Bedford Division	Tho. A. Roberts		Harrisburg, Pa.
West Pennsylvania Division	E. B. Taylor		Allegheny City, Pa.
Lewistown Division	Wm. M. Phillips		Lewistown, Pa.
Altoona Division	Wm. J. Latta		Altoona, Pa.
Pensacola & Selma	Geo. Nason		Pensacola, Fla.
Peoria, Decatur & Evansville	G. R. Cobleigh	G. R. Cobleigh	Peoria, Ill.
Perkiomen	D. B. Clack		Norristown, Pa.
Petersburg	R. Suliy	L. E. Clark	Petersburg, Va.
Philadelphia & Atlantic City	Ellis Clark	Ellis Clark	Philadelphia, Pa.
Philadelphia & Reading	*J. E. Wootten	W. S. Wilson	Philadelphia, Pa.
Catawissa & Williamsport Br.	D. C. Reinhart		Williamsport, Pa.
Reading & Columbia	Alex. M. Wilson		Columbia, Pa.
Lebanon & Tremont	H. W. Tracy		Pine Grove, Pa.
N. Penn. & B. Brook Divis'n.	E. A. Sweigard		Philadelphia, Pa.
Philadelphia & Baltimore Central	Henry Wood	Henry Wood	Philadelphia, Pa.
Philadelphia & Erie	Robert Neilson		Williamsport, Pa.
Philadelphia & Erie		Enoch Lewis	Philadelphia, Pa.
Western Division	J. W. Reynolds		Erie, Pa.
Middle Division	E. B. Westfall		Renovo, Pa.
Eastern Division	Thomas Gucker		Williamsport, Pa.
Danv., Haz. & W. Barre Div	Joseph Crawford		Sunbury, Pa.
Philadelphia, Wilmington & Balt	H. F. Kenney	Enoch Lewis	Philadelphia, Pa.
Philadelphia, Newt'n & New York	L. L. Bush		Philadelphia, Pa.
Piedmont Air-Line	T. M. R. Talcott	R. H. Duesberry	Richmond, Va.
Richmond & Danville Div	W. A. Green		Richmond, Va.
North Carolina Division	A. B. Andrews		Raleigh, N. C.
Atlanta & Charlotte Div	I. Y. Sage		Atlanta, Ga.
Pinconning	Wm. Mercer		Bay City, Mich.
Pittsburg Southern	Jos. Ramsey, Jr		Pittsburg, Pa.
Pittsburg & Castle Shannon	A. C. Hays		Pittsburg, Pa.
Pittsburg & Lake Erie	R. W. Jones		Pittsburg, Pa.
Pittsburg, Cincinnati & St. Louis	S. M. Felton, Jr	William Mullins	Pittsburg, Pa.
Pittsburg, Cincinnati & St. Louis	*D. W. Caldwell		Columbus, O.
Pitts., Cin. & St. Louis Div	J. H. Barrett		Pittsburg, Pa.
Col., Cin. & Ind., Cent. Div.	C. C. F. Bent		Logansport, Ind.
Col., Chi. & Ind., Cent. Div.	J. F. Miller		Richmond, Ind.
Indianap. & Vincennes Div	E. W. McKenna		Indianapolis, Ind.
Cincin. & Musk. Valley Div	Wm. F. Black		Zanesville, O.
Little Miami Div	Ralph Peters		Cincinnati, O.
Pittsburg, Bradford & Buffalo	M. Mandevill		Foxburg, Pa.
Pittsburg, Ft. Wayne & Chicago	D. W. Caldwell	William Mullins	Pittsburg, Pa.
Pittsburg, Ft. Wayne & Chicago	‡C. E. Gorham		Chicago, Ill.
Eastern Division	George S. Griscom		Pittsburg, Pa.
Western Division	C. D. Gorham		Fort Wayne, Ind.
Pittsburg & Western	J. R. Bonner		Allegheny, Pa.
Pittsburg, Titusville & Buffalo	Tho. H. Wilson		Oil City, Pa.
Pittsburg, Titusville & Buffalo		John L. Awl	Pittsburg, Pa.
Pittsburg, Virginia & Charleston	J. M. Byers		Pittsburg, Pa.
Port Dover & Lake Huron	A. B. Atwater		Woodstock, Ont.
Port Huron & Northwestern	*I. R. Wadsworth		Port Huron, Mich.
Port Royal & Augusta	R. G. Fleming		Augusta, Ga.
Portland & Ogdensburg	Jonas Hamilton	Jonas Hamilton	Portland, Me.
Portland & Rochester	G. P. Wescott, *Rec*		Portland, Me.
Potomac, Fredericksb'h & Pied't	Charles Kennedy		Fredericksb'h, Va.
Poughkeepsie, Hartford & Boston	J. A. Perkins	J. A. Perkins	Poughkeepsie, N. Y
Prince Edward Island	L. B Archibald	L. B. Archibald	Charlottet'n, P. E. I
Prospect Park & Coney Island	R. Schermerhorn		Coney Island, N. Y
Providence & Springfield	William Tinkham	William Tinkham	Providence, R. I.
Providence & Worcester	W. E. Chamberlain		Providence, R. I.
Providence, Warren & Bristol	Waterman Stone		Providence, R. I.
Q			
Quebec, Mont., Ott'a & Occidental	L. A. Senecal	W. E. Blumhart	Montreal, Can.
Quebec Central	§A. Steele		Sherbrooke, Can.
Queen Anne & Kent County	P. H. Irwin		Centreville, Md.
Quincy, Missouri & Pacific	F. D. Schermerhorn		Quincy, Ill.
R			
Raleigh & Augusta Air-Line	J. C. Winder		Raleigh, N. C.
Raleigh & Gaston	J. C. Winder		Raleigh, N. C.
Rhinebeck & Connecticut	J. H. Jones		Rondout, N. Y.
Richmond, York Riv. & Chesap'ke	H. T. Douglas	B. S. Crouch	Richmond, Va.
Richmond & Allegheny	*Decatur Axtell		Richmond, Va.
Richmond, Frederick'h & Potomac	E. T. D. Myers	T. L. Courtney	Richmond, Va.
Richmond & Petersburg	Theo. D. Kline		Richmond, Va.
Rio Grande	*M. J. Gomila		Brownsville, Tex.
Rochester & Pittsburg	Geo. E. Merchant	Geo. E. Merchant	Rochester, N. Y.
Rockwood & Tennessee River	H. Clay Evans		Rockwood, Tenn.
Rock Island & Mercer County	*R. R. Cable		Rock Island, Ill.
Rock Island & Peoria	H. B. Sudlow		Rock Island, Ill.
Rome	Eben Hillyer		Rome, Ga.
Rome, Watertown & Ogdensburg	E. A. Van Horne		Watertown, N. Y.
Rome, Watertown & Ogdensburg		G. W. B. Cushing	New York City.
Rumford Falls & Buckfield	O. Hayford		Canton, Me.
S			
St. Croix & Penobscot	Wallace Haycock		Milltown, Me.
St. Lawrence & Ottawa	†Tho. Reynolds	Tho. Reynolds	Ottawa, Can.
St. Johns	R. McLaughlin		Jacksonville, Fla.
St. John & Maine	H. D. McLeod		St. John, N. B.
St. Johnsbury & Lake Champlain	A. B. Jewett		St. Johnsbury, Vt.
St. Joseph & Des Moines	J. F. Barnard		St. Joseph, Mo.
St. Joseph & Western	L. D. Tuthill		St. Joseph, Mo.
St. Joseph & Western		A. D. Clarke	Omaha, Neb.
St. Louis, Alton & Terre Haute	Beriah Warren	Beriah Warren	St. Louis, Mo.
St. Louis, Hannibal & Keokuk	W. W. Walker		Hannibal, Mo.
St. Louis, Iron Mountain & South		W. S. Cuddy	St. Louis, Mo.
Texas Division			Texarkana, Ark.
Missouri Division	Wm. Kerrigan		St. Louis, Mo.
St. Louis & San Francisco	*C. W. Rogers	A. G. Thompson	St. Louis, Mo.
Mo. & Ark. Division	W. A. Thoms		Springfield, Mo.
Kansas Division	J. R. Wentworth		Neodesha, Kan.
St. Louis, Keokuk & Northwest'n	A. L. Griffin	John A. Blood	Keokuk, Ia.
St. Louis, Salem & Little Rock	E. B. Sankey		Salem, Mo.
St. Louis, Salem & Little Rock		H. A. Crawford	St. Louis, Mo.
St. Louis Bridge Co. & Tunnel R. R.	J. B. Van Dyne	J. E. Williams, Jr	St. Louis, Mo.
St. Louis Coal	R. J. Cavett		Carbondale, Ill.
St. Paul & Duluth	E. Q. Sewell		St. Paul, Minn.
St. Paul, Minneapolis & Manitoba	*Jas. J. Hill	J. C. Morrison	St. Paul, Minn.
St. Paul, Minneapolis & Manitoba	E. B. Wakeman		St. Paul, Minn.
Fergus Falls Division	J. B. Rice		St. Paul, Minn.
Minneapolis & Breck. Div	A. Guthrie		Minnaapolis, Minn.
Northern Division	C. O. Wheeler		Fergus Falls, Minn.
St. Paul & Sioux City	E. W. Winter		St. Paul, Minn.
Sacramento & Placerville	Josiah Johnson		Sacramento, Cal.
Saginaw Valley & St. Louis	N. W. Merrill	N. W. Merrill	Saginaw, Mich.
San Francisco & North Pacific	H. C. Whiting		Petaluma, Cal.
Savannah, Florida & Western	*H. S. Haines	W. B. McKee	Savannah, Ga.
Savannah, Florida & Western	§F. S. Pendergast		Savannah, Ga.
Savannah & Memphis	*G. J. Foreacre		Atlanta, Ga.
Schuylkill & Lehigh	Eldridge Dale		Slatington, Pa.
Scioto Valley	Joseph Robinson		Columbus, O.
Sciota Valley		C. H. Cory	Portsmouth, O.
Seaboard & Roanoke	J. M. Robinson	J. A. Walton	Baltimore, Md.
Sedalia, Warsaw & Southern	G. H. Huntington		Sedalia, Mo.
Selma & Greensboro	A. M. Fowlkes		Selma, Ala.
Shenango & Allegheny	J. T. Blair		Greenville, Pa.
Shenandoah Valley	J. H. Sands		Hagerstown, Md.
Shepaug	Edwin McNeill		Litchfield, Conn.
Sioux City & Pacific	J. S. Wattles		Missouri Valley, Ia.
Sioux City & Pacific	*P. E. Hall	P. E. Hall	Cedar Rapids, Ia.
Skaneateles	J. McNamara		Skaneateles, N. Y
South Carolina	John B. Peck	S. B. Pickens	Charleston, S. C.
Southeastern of Canada	H. A. Alden		Newport, Vt.
Southern Central	Jas. G. Knapp		Auburn, N. Y.
South Mountain	W. H. Woodward		Pine Grove Furnace, Pa.
Southern Pacific	A. C. Bassett	John R. Watson	San Francisco, Cal.
Los Angeles & Yuma Div	§E. E. Hewitt		Los Angeles, Cal.
Tulare Division	A. D. Wilder		Oakland, Cal.
South Pacific Coast	F. W. Bowen		San Francisco, Cal.
Southwestern of Georgia	W. G. Raoul		Macon, Ga.
Southwestern of Kentucky	M. Tabler		Harrodsburg, Ky.
Spartanburg, Union & Columbia	Jas. Anderson	Jas. Anderson	Spartanburg, S. C.
Springhill & Parsboro	J. A. Killam		Parsboro, N. S.
Springfield & Western Missouri	T. F. Oakes		Springfield, Mo.
Spring'd, Effingham & So. East'n	E. P. Buell		Robinson, Ill.
State Line & Sullivan	J. O. Blight		Towanda, Pa.
Staten Island	John W. Wilber		Tottenville, N. Y.
Sterling Mountain	J. C. Missimer		Sloatsburg, N. Y
Summit Branch	R. C. Peebles		Lykens, Pa.
Sussex & Blairstown	A. Reasoner		Newtown, N. J.
Sycamore, Cortland & Chicago	Elry Hall		Sycamore, Ill.
Syracuse, Binghamton & N. Y	W. K. Niver		Syracuse, N. Y.
Syracuse, Binghamton & N. Y		G. W. B. Cushing	New York, N. Y.
Syracuse, Chenango & New York	Albert Allen		Syracuse, N. Y.
Syracuse, Geneva & Corning	A. H. Gorton	Andrew Beers	Corning, N. Y.
T			
Tennessee & Pacific	J. W. Thomas		Nashville, Tenn.
Terre Haute & Ind'apolis } Van-	Col. Josh A. Hil		St. Louis, Mo.
Terre Haute & Ind'apolis } dalia	Joshua Staples		Indianapolis, Ind.
Terre Haute & Ind'apolis } Line.		C. R. Peddle	Terre Haute, Ind.
Logansport Division			Logansport, Ind.
Terre Haute & Southeastern	George Atherton		Terre Haute, Ind.
Texas & New Orleans	C. A. Burton	P. B. Watson	Houston, Tex.
Texas & Pacific	H. M. Hoxie	C. C. Commisky	Marshall, Tex.
Jefferson Division	J. S. Noble		Texarkana, Ark.
Southern Division	C. Harris		Marshall, Tex.
Texas Western	J. W. Goodwin		Houston, Tex.
Texas & St. Louis	J. W. Brown		Tyler, Tex.
Tioga	L. H. Shattuck		Blossburg, Pa.
Tioga		Jas. A. Drake	Elmira, N. Y.
Toledo, Delphos & Burlington	W. G. Brownson	H. A. Eaton	Delphos, O.
Dayton Division	J. O. Arnold		Dayton, Ohio
Toledo & Ann Arbor	H. W. Ashley		Ann Arbor, Mich.
Tonawanda Valley	J. V. D. Loomis		Attica, N. Y.
Troy & Boston		D. Robinson	Troy, N. Y
Toronto, Grey & Bruce	*Edmund Wragge	W. Watson	Toronto, Can.
Toronto & Nipissing	John Duncan	John Symons	Toronto, Can.
Tuckerton	J. J. Pharo		Tuckerton, N. J.
U			
Ulster & Delaware	Geo. Coykendall		Rondout, N. Y.
Union Pacific	*S. H. H. Clarke	A. D. Clark	Omaha, Neb.
Union Pacific	§Jas. T. Clarke		Omaha, Neb.
Eastern Division	P. J. Nichols		Omaha, Neb.
Western Division	W. B. Doddridge		Evanston, Wy. T.
Mountain Division	Robert Law		Cheyenne, Wy. T.
Laramie Division	Edw. Dickinson		Laramie, Wy. T.
Colorado Division	A. A. Egbert		Denver, Col.
Kansas Division	S. T. Smith		Kansas City, Mo.
Denver & S. Park Division	C. W. Fisher		Denver, Col.
Utah Central	John Sharp	S. H. Hill	Salt Lake City.
Utah Northern	Geo. W. Thatcher		Logan, Utah.
Utah Southern	John Sharp		Salt Lake City, Ut'h
Utah Western	*W. W. Riter	W. W. Riter	Salt Lake City.
Utica & Black River	J. F. Maynard		Utica, N. Y.
Utica, Ithaca & Elmira	Geo. J. Rice	J. L. Greatsinger	Horse Heads, N. Y
V			
Vaca Valley & Clear Creek	G. B. Stevenson		Vacaville, Cal.
Valley	Samuel Briggs	Samuel Briggs	Cleveland, O.
Vicksburg & Brunswick	W. G. Raoul		Macon, Ga.
Vermont Valley	John Mulligan		Springfield, Mass.
Vicksburg & Meridian	*John Scott	E. F. Raworth	Vicksburg, Miss.
Vicksburg, Shreveport & Pacific	*John Scott		Monroe, La.
Vicksburg, Shreveport & Pacific	F. Y. Dabney		Monroe, La.
Virginia & Truckee	H. M. Yerington	C. P. Mason	Carson, Nev.
Virginia Midland	Peyton Randolph		Alexandria, Va.
W			
Wabash, St. Louis & Pacific	*John C. Gault	R. W. Green	St. Louis, Mo.
Eastern Division	R. Andrews		Toledo, O.
Western Division	Thos. McKissock		St. Louis, Mo.
Illinois Division	H. F. Clark		Springfield, Ill.
Ohio & Indiana Division	Geo. W. Stevens		Fort Wayne, Ind.
St. L., K. C. & N	G. B. Parsell		Moberly, Mo.
Council Bluffs & Omaha Div	J. W. Blanchard		Stanberry, Mo.
Chicago & Iowa Division	W. F. Merrill		Chicago, Ill.
Kansas City Division	M. G. Cary		Kansas City, Mo
Quincy, Mo. & Pacific Div	F. D. Schermerhorn		Quincy, Ill.
Chicago Division	A. H. Wood		Chicago, Ill.
Iowa Division	E. N. Armstrong		Keokuk, Ia.
Rantoul Division	T. B. Burnett		Rantoul, Ill.
Peoria Division	F. L. Tompkins		Peoria, Ill.
Wabash, Chester & Western	J. L. Hinkley		Chester, Ill.
Wallkill Valley	J. H. Jones		Rondout, N. Y.
Warwick Valley	Grinnell Burt		Warwick, N. Y
Washington & Ohio	R. H. Havener	R. H. Havener	Alexandria, Va.
Waynesburg & Washington	Jacob Swart		Waynesburg, Pa.
Welland	William Pay		St. Catherine, Ont
Westchester & Philadelphia	Henry Wood	Henry Wood	Philadelphia, Pa.
West Feliciana	J. B. McGehee	J. B. McGehee	Bayou Sara, La.
West Jersey	Jos. Crawford		Camden, N. J.
Western Counties	J. Brignell		Yarmouth, N. S.
Western of Alabama	*Cecil Gabbett	Cecil Gabbett	Montgomery, Ala.
Western & Atlantic	Wm. McRae	W. R. Webster	Atlanta, Ga.
Western Maryland	*J. M. Hood	J. M. Hood	Baltimore, Md.
Western North Carolina	A. B. Andrews	Geo. P. Erwin	Asheville, N. C.
Whitewater	W. W. Worthington		Ft. Wayne, Ind.
Whitby, Port Perry & Lindsay	†Jas. Holden		Whitby, Ont.
Wicomoco & Pocomoke	H. R. Pitts		Berlin, Md.
Williamstown	J. F. Bodine		Williamstown, N. J.
Wilmington, Columbia & Augusta	J. F. Divine	J. F. Divine	Wilmington, N. C.
Wilmington & Northern	J. H. Thompson		Coatesville, Pa.
Wilmington & Weldon	J. F. Divine	J. F. Divine	Wilmington, N. C.
Windsor & Annapolis	*P. Innes		Kentville, N. S.
Wisconsin Central	*F. N. Finney	J. W. Curtiss	Milwaukee, Wis.
Mil. & Eastern Div	C. F. Dutton		Milwaukee, Wis.
So. Mid. & Northern	G. Campbell		Steven's Point, Wis.
Wisconsin Valley	F. O. Wyatt		Tomah, Wis.
Woodstock	J. G. Porter		Woodstock, Vt.
Worcester & Nashua	G. W. Hurlburt	C. S. Turner	Worcester, Mass.
Worcester & Shrewsbury	J. F. Bigelow		Worcester, Mass.
Worcester & Somerset	F. J. Painter		Philadelphia, Pa.
Y			
Youghiogheny	Wm. Wilson		Irwin's, Pa.



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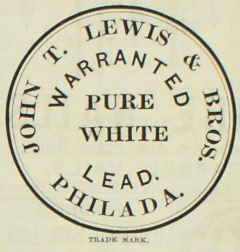

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For shafting and places where waste can not be used, mix the Compound with oil, and apply to the bearing. If the bearing be very hot, the first application may run off, but two or three applications will cool it.
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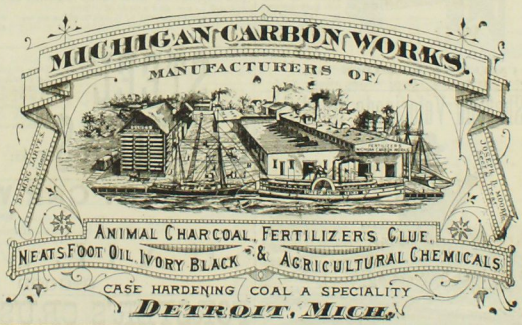

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